NATIONAL SEMINAR

on

Innovative Agricultural Extension Approaches for Holistic Development of Farming Community

Compendium

Lead Paper & Abstract

January 6-7, 2024 at Sardarkrushinagar

Society of Extension Education, Gujarat

and

Sardarkrushinagar Dantiwada Agricultural University

Sardarkrushinagar-385 506

Gujarat, India

Society of Extension Education, Gujarat
EXECUTIVE COUNCIL

NATIONAL SEMINAR

on

Innovative Agricultural Extension Approaches for Holistic Development of Farming Community

January 6-7, 2024
at
Sardarkrushinagar

Compendium

Editors

D. B. Patel
Arnab Biswas
Aniket R. Despande

Society of Extension Education, Gujarat
and
Sardarkrushinagar Dantiwada Agricultural University
Sardarkrushinagar-385 506
Gujarat, India

Compendium : **Innovative Agricultural Extension Approaches for Holistic Development of Farming Community**

Editors : D. B. Patel, Arnab Biswas, Aniket R. Despande

Publication Year : 2023

Copies : 400

Published by : Organizing Secretary
Professor & Head
Department of Agricultural Extension & Communication
C. P. College of Agriculture
Sardarkrushinagar Dantiwada Agricultural University
Sardarkrushinagar-385506. Gujarat, India

Disclaimer : Opinions in publication are those of authors and not necessarily of the Organizing Secretary.

Place of Publication : Sardarkrushinagar

Printer : Asian Printery
Opp. Talati Hall, Nr. Bhutni Ambali,
Raipur, Ahmedabad
M.: 98254 76046

भाकृअनुप
ICAR

भारतीय कृषि अनुसंधान परिषद
कृषि अनुसंधान भवन–1, पूसा, नई दिल्ली 110 012
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
Krishi Anusandhan Bhawan-I, Pusa, New Delhi – 110012
Phone: 91-11-25843277 (O)
E-mail: ddg-extn.icar@gov.in ; us.gautam@icar.gov.in

डॉ. ऊधम सिंह गौतम
उप महानिदेशक (कृषि विस्तार)
Dr. U.S. Gautam
Deputy Director General (Agril. Extn.)

MESSAGE

Agriculture is the backbone of our country. Majority of the people in India are small and marginal farmers whose fields are scattered all over the country. Agriculture sector plays a major role in the prosperity of the country. This necessitates the importance of extension system in the country which helps in dissemination of technologies from lab to the field thereby playing a irreplaceable role in the socio-economic well being of the farmers. Nowadays, agriculture sector has undergone drastic changes focusing on natural resource base, policy environment and uneven regional development in the country. Therefore, the mandates of agricultural extension is increasing with challenges of huge yield gap, climate change related risks and vulnerabilities, continuing land fragmentation, emergence of large scale agri-food retails, declining natural resources base, gender concerns *etc*.

Extension system in our country has a multi agency approach since only multi agencies can fulfil the requirements of vast farming population in India which is spread all over the country in different agro climatic conditions. These agencies will be able to develop and refine the technology or disseminate the information relevant to the area in proximity to them and will also be able to have regular contact with the farmers and therefore they can address their issues on time. Agricultural extension system has an important part to play in transforming our agriculture to sustainable one by looking at the farmers' well being in a holistic manner.

In this context, I have great pleasure in learning that Sardarkrushinagar Dantiwada Agricultural University in collaboration with the Society of Extension Education, Gujarat (SEEG) in organizing a national seminar on 'Innovative Agricultural Extension Approaches for Holistic Development of Farming Community' on 6-7 January 2024. By looking at the themes of the seminar, I felt that these are the need of the hour. The huge participation from all over the country and from all the domains of the agriculture field assures the need of such a national seminar in today's world.

I congratulate all the members of the organizing committee for coming out with the Seminar Compendium comprising success stories of farmers, lead papers and research abstracts. I hope that the deliberations in this seminar will address recent issues and point out some practical solutions for better socio-economic development of farmers.

I extend my greetings to all the participants and delegates from all over the country and wish them all the best for making the National Seminar successful.

(U S Gautam)

Dr. R. M. Chauhan
Vice Chancellor
SDAU
Sardarkrushinagar (Gujarat) - 385 506

Message

Agriculture is the most important source of livelihood for majority of the people and undoubtedly it is contribute towards the prosperity for any country. Since time immemorial this sector has been undergone many changes – from subsistence to commercial agriculture and now with added focus on sustainability. We cannot undermine the effect of high use of external inputs, over exploitation of ground water and above all, the effect of climate change on agriculture. Our efforts and scientific explorations must be aimed to make this world suitable for future generations. The sustainable agricultural technologies which are developed by the research subsystem must be disseminated to the farming community by the extension subsystem in innovative ways.

In the age of this information era, our messages must be communicated to the ultimate users in creative ways. One can create interest and convince the farmers by using innovative approaches to reach them out.

And to induce a true development of agriculture, one should not only look after the crop production technologies but also the all other related issues of farmers in a holistic manner. Our research must tailor maid with such holistic developmental issues.

I am happy to note that Sardarkrushinagar Dantiwada Agricultural University in collaboration with the Society of Extension Education, Gujarat (SEEG) has considered these view points and is organizing a national seminar on 'Innovative Agricultural Extension Approaches for Holistic Development of Farming Community' on 6-7 January 2024. Themes of the seminar are found to be need of the time and benefitting all the stakeholders. The seminar also focuses on the Human Resource Development aspect of the sector as well as entrepreneurship development for the new generation to make them job creators instead of job seekers.

I congratulate the Organizing Secretary and committee members for bringing out this Seminar Compendium comprising success stories of farmers, lead papers and abstracts in time-bound and an efficient manner.

I warmly extend my greetings to all the participants, delegates and the society members and wish them all the best for making the National Seminar a successful event.

(R. M. Chauhan)

Dr. H. B. Patel
President, SEEG and DEE
Anand Agricultural University
Anand, Gujarat 388110

Presidential Message

Extension education is critical to agricultural growth. Extension has progressed from just spreading agricultural technologies to a more comprehensive discipline of aiding farmers' well-being and long-term agricultural growth. Previous efforts have been centered on investment in research and development, with the understanding that the application of science and technology is accountable for the structural transformation necessary to drive the agricultural economy. The developing reforms and changes in agricultural knowledge structure clearly show that the old agricultural research and extension system cannot adequately handle the problems of new trends. The innovation system approach provides a comprehensive and multidisciplinary method for handling innovation and processes, embracing developing agricultural reforms and ideas. Policymakers should thoroughly examine the institutional background of any invention before pushing it, and extension workers should incorporate such knowledge into technology packages for farmers.

The extension method is similar to system doctrine in that it educates, motivates, and guides components of the system such as its structure, leadership, programme, resources, and links. As a result, a smart extension strategy saves time, money, and people who would have been spent in the development of any novel technology with its feedback system.

The current SEEG National Seminar-2023 on "Innovative Agricultural Extension Approaches for Holistic Development of Farming Community" organized jointly by SEEG and SDAU, Sardarkrushinagar from 6-7 January 2024 will provide a great opportunity for extension professionals, farmers, policymakers, and administrators to contribute their knowledge and expertise.

On this occasion, I would like to express my profound thanks to Dr. R. M. Chauhan, Hon'ble Vice Chancellor, SDAU, Sardarkrushinagar, for his unwavering support and mentoring in organising this seminar. My heartfelt compliments to Dr. D. B. Patel, organizing secretory of this seminar. I thank and acknowledge all of the main presenters, attendees, innovative farmers, members of the society, and those who assisted with organizing the seminar. I wish you all the best for the seminar's spectacular success.

(H. B. Patel)

Dr. D. B. Patel
Organizing Secretary
Professor & Head
Department of Agricultural Extension
& Communication
C. P. College of Agriculture
SDAU, Sardarkrushinagar-385506

Editorial...

Today Agricultural Extension is at its cross age where the paradigm of its application shifts towards innovative application of decision, tools, methods and approaches. Agricultural Extension requires continuous renewal of its content, methods and approaches. So, we have to think not only in present context but also for the future to make the discipline more competitive and fruitful. Development must be holistic in nature; not only crop production but also the wellbeing of the farmers must be look after. For better conceptualisation and inviting discussions on the reformed view of extension, the Gujarat Society of Extension Education in collaboration with Sardarkrushinagar Dantiwada Agricultural University (SDAU) is organising a National Seminar on "Innovative Agricultural Extension Approaches for Holistic Development of Farming Community" on 6 - 7 January, 2024 at Sardarkrushinagar, Dantiwada, Gujarat.

The seminar covers six broad thematic areas representing holistic view of extension. Transfer of technology and its impact and Human resource and entrepreneurship development. It is quite ecstatic for us that with professionals, researchers and students of the discipline farmers are also participated enthusiastically in the seminar. We feel happy to share that all together 30 lead papers, 285 abstracts and 08 success stories of innovative farmers have been published in this seminar compadium.

We wholeheartedly thank Prof. (Dr.) R. M. Chauhan, Hon'ble Vice-Chancellor, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, for granting permission to organise this National Seminar at SDAU, and for acting as a mentor and valuable advisees for smooth running of the seminar. We are also heavily indebted to Dr. P. T. Patel, Registrar, SDAU, Dr. C. M. Murilidhararn, DoR SDAU and Dr. A. G. Patel, DEE, SDAU for their immense support to organise the seminar. We extend our gratitude to Dr. S. D. Solanki, Dean, C. P. College of Agriculture, SDAU, for providing continuous support, guidance and encouragement to make the event successful. We are also thankful to Dr. H. B. Patel, President, SEEG and members of the Executive Council of SEEG who have been with us right from the beginning.

Its a matter of proud for all of us that our journal gets NAAS rating of 5.30 in 2024. We congratulate and extend our best wishes to all our participants, lead speakers and innovative farmers without whom this seminar would never become successful. To honour and motivate them we have come up with awards for Innovative Farmers, Young Scientists, Best Oral Presentation and Best Poster Presentation.

It would be incomplete without acknowledging the hard efforts of all conveners and members of various committees, colleagues, friends and students for rendering their valuable services to make the seminar successful.

(D. B. Patel)

INDEX

ABSTRACTS

Theme 1: Innovative Extension Approaches, Agricultural Marketing Reforms and Policies

SUCCESS STORY

Sardarkrushinagar Dantiwada Agricultural University Zone

SS 1

Journey from Agriculture graduate to successful Agri.-entrepreneur

Name : **Mayur Kiranbhai Prajapati**
Address : Bhopanagar Ta. Deesa Dist. Banaskantha
Age : 27 Years
Mobile No : 9624323551
Education : B.Sc. Agriculture
Land holding : 1-82-47 ha
Occupation : Farming (Nursery unit, contract farming, potato, groundnut and vegetables)

Information about innovation adopted by farmer

- Mr. Mayur Prajapati, a graduate student of SDAU, Dantiwada belongs to farming community and more interested in Hi-tech innovative farming on his farm in-spite of searching of Jobs.
- He has 1-82-47 ha of land under MIS and cultivating groundnut, potato and pearl millet along with livestock.
- After completion of B.Sc. Agri. he planned for diversified off seasonal vegetables cultivation under the guidance of Scientist of KVK, Deesa (Banasknatha-I).
- Through the cultivation of vegetables by adopting mulching, drip irrigation, stacking for trailing of vines and intercropping he has started his journey.
- After receiving good income and success he shifted in next phase by establishing shade net for plug tray nursery on 0.24 ha and then strengthens on 0.48 ha after visiting nurserymen and getting guidance and support from Scientist of KVK, Deesa (Banasknatha-I).
- He is providing healthy and quality seedlings of tomato, brinjal, chilli, watermelon, muskmelon, cabbage, cauliflower, papaya etc. to the farmers of Banaskantha, Sabarkantha, Anand, Rajkot etc. and providing technical knowledge of crops by visiting the plots on free of cost.
- He has taken 42 vigha (10 vigha) land on rent in Deesa and Palanpur block and started cultivation papaya, capsicum, G-4 chilli (Export), muskmelon (Export) for getting higher income.
- Through nursery unit, Mr. Mayur earned net profit of Rs. 3.15 lakh in year 2019-20 and reached to 30.35 lakh in 2021-22 and he is role model for educated youngers who migrated from villages to city for job.
- Former Central Minister of Agriculture and Farmers Welfare Shri. Narendra Singh Tomar also appreciated his efforts and giving example to other youngsters of India in online interaction programme on 16th July 2022.
- HORIZONTAL SPREAD OF INNOVATION: Many farmers from Rajasthan and different districts of Gujarat as well as Agri. students visiting his farm and nursery unit. Farmers from Sabarkantha, Anand, Rajkot, Banaskantha etc. districts are purchasing seedlings of Horticulture crops from his nursery and getting healthy and quality planting material.
- **HONOUR :**

Awards/honour	Achievement	By whom	Year
Commendation certificate	Hi-tech farming	Krushi Mela, Deesa	2019-20
Commendation certificate	Hi-tech farming	Krushi Mahotsav, Deesa	2019-20
Commendation certificate	Young Agri - entrepreneur	SAC, KVK, Deesa	2020-21

Table: Economics of nursery unit

Season	Net profit (Rs. In Lakh)		
	2019-20	2020-21	2021-22
Kharif	1.40	7.00	11.85
Rabi	0.45	1.65	8.00
Summer	1.30	3.25	10.50
Total	3.15 lakh	11.90 lakh	30.35 lakh

SS 2

Success story of horticulture based multiple cropping

Name : **Ramjibhai Dudhbahi Goletar**
Address : Village + Post Lavana, Taluka lakahani, District: Banaskantha 385535
Age : 40
Occupation : Farming
Source of irrigation : Tub well
Land holding : 4.5 ha.

Information about innovation adopted by farmer

- Before adopting this, I was cultivating castor and pearl millet in kharif and mustard in Rabi season. I was fallowing conventional farm practices (broadcasting sowing methods, old crop verity) and was getting minimal yield from per unit area. In spite of having good irrigation facility, I was unable to get good income from my farm.
- During the training program at kvk Tharad in the year 2019 I got to know about the horticultural based multiple cropping system after the discussion with Scientists I planned to cultivate Date palm and Guava in my field in one ha area.
- In Jun 2019 the dateplam plantation was done by digging a pit of 60 x 60x 60 cm at the distance of 10 X 10 meter. 5 kg of FYM, 2 kg castor cake and 2 kg Neem cake as well as 50% phosphorus and potash were filled as base material. Subsequently standard package and practices was fallowed to develop the plant stands. Apart form this I also have planted guava variety (Tiwan red) in between the date palm, keeping a distance of 3.0 x 10 meters between two plants and Row. A total of 333 guava plants have been maintained in the field.
- During the *kharif* 2019-20 I have taken Guar at 7.5 m X 0.15 m spacing between date palm and guava and during rabi Mustard was taken as intercrop. Similarly during the kharif season of 2020-21 I have taken Kalingda between date palm and guava at 7.5 m x 1.0 m spacing and cucumber During the Summer season as an intercrop.
- Soil nutrient and water management was done as per advice of the scientist, to maintain the soil productive I regularly apply Jeevamrut with srip irrigation sytem and ghan jeevamrut yearly twice befor mansson and after mansson @ 25 - 30 kg per plant. I also applied Trico derma, Pseudomonas and mycorrhiza.
- In the year 2019-20 I earned total Rs 83,060 net profit from intercrops (Guar and Mustard). However In the year 2020-21, got a net profit of Rs 99,800 from the winter season crop of guava and Rs 47,360 from intercrop (cucumber and Watermelon), totalling of Rs 1,47,160 during the year. Then in the year 2021-22, a total net profit of 1, 30,430 rupees was obtained from guava.
- Date plam Production was started in 2022-23 and harvested 42.60 quintals of date fruit. This was sold at the price of 55 to 65 rupees per kilogram and earned a total amount of 2.76 lakhs. Excluding the expenditure of Rs 2, 10,300 incurred during the last three years, the total net profit of Rs 66,600 achieved further Rs 1,40,200 net profit got from guavas. Totalling both I earned net profit of Rs 206,800 during the year.

Year wise Production of Date palm, Guava and other inter crops

Particular	2019-20				2020-21				2021-22		2022-23	
	Main Crop	Inter crops			Main Crop	Inter crops			Main Crop	Inter crops	Main Crop	Inter crops
		Kahrif		Rabi		Kahrif		Rabi		Rabi		Rabi
	Date palm	Guava	Guar	Mustard	Date palm	Guava	Tarbuj	Cucumber	Date palm	Guava	Date palm	Guava
Area (ha.)	1.0				1.0				1.0		1.0	
Production (kg)	-	-	1080	935	-	2600	2200	1533	-	3400	4260	4200
Income (₹)	-	-	45360	55000	-	119600	24200	30660	-	153000	276900	168000
Expenditure (₹)	195000	58000	9800	7500	6800	19800	3500	4000	8500	22570	210300	27800
Net Profit (₹)	-	-	**35560**	**47500**	**-**	**99800**	**20700**	**26660**	**-**	**130430**	**66600**	**140200**
Total annual net profit (₹)			**83060**		**147160**				**130430**		**206800**	

Anand Agricultural University Zone

SS 3

Success story of Natural Farming

Name	:	**Kiritsinh Kalyansinh Chauhan**
Age	:	37
Occupation	:	Farming
Permanent Address	:	Village.Untkhari Ta.Umreth Dist.Anand
Agricultural Land	:	0.93 ha.
Source of Irrigation	:	Tube Well

Innovative Approach Adoption

- Adopted Natural Farming.
- Due to adoption of Natural Farming fertility of soil improved and number of earthwarms and soil also increased.
- He also prepared *Nimastra, Dashparni Ark and* many others inputs required for natural farming by his own.
- He also distributed these inputs to the surrounding farmers of his area.
- Getting best market price of his crop produced.

INCOME DETAILS

Year	Name of Crop	Area (Ha.)	Yield (Kg.)	Total Income (Rs./Ha.)	Total Cost (Rs./Ha.)	Total Profit (Rs./Ha.)
2019-20	Paddy	0.24	1500	29100	5800	23300
	Okra	0.24	5000	130000	40000	90000
2020-21	Paddy	0.24	1600	32640	6300	26340
	Okra	0.24	5500	145000	46000	99000
2021-22	Paddy	0.24	1740	37932	6800	31132
	Okra	0.24	5960	162000	50000	112000

Award received:

1. Kisan No.1 Mahindra Samriddhi Samman from Mahindra Tractors Year 2012
2. deVGen Progressive Farmer Award from deVGen – Dhan Dhanya Vigyan Year 2019-20

SS 4

Success story of Natural Farming

Name	:	**Damor Mansinh Pratapsinh**
Age	:	68
Occupation	:	Farming
Permanent Address	:	Village.Dahod Ta.Dahod Dist.Dahod
Agricultural Land	:	0.80 ha.
Source of Irrigation	:	Tube Well

Innovative Approach Adoption

- Cost of production and cultivation is reduced due to adoption of Natural Farming.
- Guided number of farmers to adopt Natural Farming.
- Water retention capacity of soil increased.

Year	Name of Crop	Area (Ha.)	Yield (Kg.)	Total Income (Rs./Ha.)	Total Cost (Rs./Ha.)	Total Profit (Rs./Ha.)
2019-20	Maize	0.4	500	8325/0.4	5388/0.4	2936/0.4
	Chickpea	0.4	450	16920/0.4	8623/0.4	8297/0.4
2020-21	Maize	0.4	425	7080/0.4	5220/0.4	1860/0.4
	Chickpea	0.4	510	19178/0.4	8850/0.4	10327/0.4
2021-22	Brinjal	1	32750	39330	63750	329250
	Chili	1	7400	133200	82000	51200
	Tomato	1	15200	228000	64500	163500

Award received:

1. Sanman Patra from ATMA, Dahod Year: 2022-23
2. Sanman Patra from ATMA, Dahod Year: 2023-24

Junagadh Agricultural University Zone

SS 5

Success story of Agriculture with Animal Husbandry

Name of the Farmer	:	**Lunagariya Anilbhai Govindbhai**
Age	:	38
Education	:	10th
Occupation	:	Animal Husbandry
Address	:	Pitrukrupa, Laxmivadi Plot, Sarpadad, Ta. Padadhari, Dist. Rajkot
Agricultural Land	:	2.0 ha.
Source of Irrigation	:	Canal

Innovation carried out by the Farmer:-

- He is doing the vaccination in animals at appropriate time which keep his animal healthy and produce more yield in terms of milk.
- He also using the mineral mixture, salt and other ingredients in cattle feed. By using this he is able to increased milk production.
- He also selling the milk directly to the customers and getting more profit.

Income Data

Year	Total No. of Animal	Total No. of Milching animal	Total Income	Total Cost	Total Profit
2019-20	20	13	1092000	547500	544500
2020-21	24	15	1365000	657000	708000
2021-22	30	19	1729000	820000	909000

Diffusion of Innovation among the farming community

- He is the young and enthusiastic farmer of the Rajkot district. He provides the best example of the scope of Animal Husbandry for small farmers. Many livestock owners of that area are visiting his animal farm and motivated by him. After visiting many farmers adopted newly released technologies and achieved more milk production and profit.

SS 6

Success story of Cultivation of Turmeric and Processing

Name of the Farmer	:	**Patel Kalubhai Punjabhai**
Age	:	66 yaer
Education	:	6th
Occupation	:	Agriculture
Address	:	Vadod, Ta. Vadhvan, Dist. Surendrnagar
Agricultural Land	:	2.83 ha.
Source of Irrigation	:	Tube well

Innovation carried out by the Farmer:-

- He is doing turmeric cultivation under natural farming, also having GOPCA certificate of Natural farming.
- Cultivated turmeric on raise bad with drip irrigation which provide him higher yield.
- Also using the Jivamrut and Akada ark with irrigation water for insect and pest control.
- Also selling fresh pickle of turmeric under "Shakti Organic brand" which provide him more profit.

Year	2019-20		2020-21		2021-22	
	Kharif	**Summer**	**Kharif**	**Summer**	**Kharif**	**Summer**
Crop	Turmeric	Bajari	Turmeric	Bajari	Turmeric	Bajari
Total Area (ha.)	1.2	1.2	1.2	1.2	1.2	1.2
Total Production (Kg.)	3000	2000	3200	2100	3400	2400
Total Income (Rs.)	600000	30000	740000	37000	816000	53000
Total Cost	200000	10000	40000	13000	50000	14000
Total Net Income	400000	20000	664000	24000	766000	39000

Diffusion of Innovation among the farming community

He is the well experienced farmer of the Surendrnagar district. He provides the best example of the scope of value addition and processing in agriculture for small farmers. Two neighbour farmers are motivated by him for turmeric cultivation and processing. He also takes part in the krushi Mahotsav in the district and provides valuable information to the farmers regarding turmeric cultivation and processing.

Navsari Agricultural University Zone

SS 7

Success Story of Medicinal Mushroom Cultivation

Name of Farmer	:	**Ravi R Saliya (Pramukh Foods)**
Age	:	32
Education	:	M.B.A.
Occupation	:	Mushroom Farming
Address	:	Survey no. 220, Near Bhakti International School, Kathodra, Surat 394326
Agriculture land	:	0.23 hector

About Mushroom Farming:

- Mr. Ravi Saliya has completed his education in MBA marketing and he is having experience in many company like Sheela foam pvt. Ltd, TATA Classedge and others. But as he wanted to do something new and wanted to start his own business he did researching in Google for new business and decided to venture into mushroom business, after doing more research in mushroom he started mushroom business. To further increase knowledge he went to Uttarakhand for Mushroom training for 12 days where he learned about spawn making process, cultivation process, and little bit about medicinal mushroom.
- In 2019 he starts construction of his mushroom plant, he started taking production from January 2020. Till the time he searches out the best quality raw material for Ganoderma mushroom, initial he was using teak wood sawdust but somehow he failed, costing more than 20000 bag and surmounting loss of around 10 lakhs. He remained in touch with some farmer, DMR Solan Scientist but they have some limited information because no one is doing large production on Ganoderma in India. After trial, error and experimenting he started bring culture from Canada.
- After that he started production in batch of 100 bag where he got success. Taking in account he increased their production and got success in production, in 2020-21 he got around 900 kg dry material of Ganoderma mushroom. Through self-hard work for marketing and they found the buyers who took all his stock in just 3 months. Next year he increased capacity of plant from 100 to 200 kg month production and which he is successfully running right now.
- His company "Pramukh Foods" is always reedy to share knowledge of mushroom to students and mushroom. They have client all our India right now, having good reputation in Indian medicinal mushroom farming. Due to Limited market of Ganoderma mushroom in India, 50% of clients are using Pramukh Food's Ganoderma Mushroom. Right now capacity is 200 kg dry material production per month. Asides, Pramukh foods is also successfully growing Oyster Mushroom, Lions-mane Mushroom, King Oyster mushroom.
- Whenever they have any problem they get guidance from Waghai College of Agriculture, Navsari Krushi University and Krishi Vigyan Kendra, Surat. They also help other college students and mushroom farmer to visit their farm. Anand University and Waghai college students all visited their farm. Among these students 2 students are doing research in their farm for projects. They always help mushroom lover who want to start business.

Year Wise Production

Year	Production (KG)	Total income(Rs.)	Total cost (Rs.)	Net profit (Rs.)
2019-2020	210	1106137	648986	457151
2020-2021	686	2174842	1246074	928768
2021-2022	960	3575775	2505599	1070176

SS 8

Success Story of dairy farming with value addition in cow dung

Name	:	Mr. Rajeshbhai Narotambhai Vasava
Address	:	Village: At. Pratappura, Po. Rajpipla, Taluka: Nandod, District: Narmada
Age	:	45 years
Education	:	ITI Electronics
Land	:	10 acres
Main Occupation	:	Animal Husbandry

Mr. Rajeshbhai Vasava's main Business is Animal Husbandry along with to make various products from cow urine-dung based such as Dhupbanti, Bhugalakap, Kodia, Gonail, Manure compost, Mobile anti-radiation chip, Ganesha idol and From the value addition of milk make various milk product like ghee, Butter milk, curd etc.

Prior to his career in animal husbandry, he was employed by a private company and also engaged in agriculture farming by cultivating sugarcane and cotton as the main crops, he was earning an annual income of about 2.5 lakhs. When there was a lot of difficulty in farming along with his job, he was looking for a business that would make her self-reliant then he had quit his job from private company and take up Animal Husbandry as a business. He started animal husbandry with 2 buffaloes. The animals were kept in raw and kachcha housing, fed without cutting fodder and using dung only as manure. He wanted to make this business a scientific way then He started this business by visiting his friend's dairy farm. After that he became interested in animal husbandry business, He also visited many dairy farms. Besides taking various animal husbandry seminars, Shibir, training, he got inspiration of this business through animal husbandry information.

In this way he adopted a scientific approach in animal husbandry and made great strides in the field of animal husbandry. Now he takes care of the animals by keeping them in good, clean, Pucca housing with cow rubber mat and With good watering, feeding and milking machine facilities available in his dairy farm. now he cultivates Napier fodder, which is needed round the year, so that there is no need to buy fodder, which saves him money. In addition, the used of Chaff-cutter through saves fodder and also increases milk production so that it is economically advantageous. Making various products from cow urine-dung such as Dhupbati, Bhugalkap, Kodia, Gonail, manure compost, mobile anti-radiation chip, Ganesh idol, making various articles and earning more income through animal husbandry by product. At the same time, by value addition of milk, making ghee, chaas, yoghurt, etc. and selling it on dairy farms is more economically profitable. In this way he adopted a scientific approach in animal husbandry. He increased income through animal husbandry, developed and modernized his business and established Hari Anmol Dairy Farm. As the income increases every year he Expanding his dairy farm by purchasing good dairy Gir cows and Mehsana/Banni buffaloes, The current situation he has total 56 Dairy animal in his Anmol dairy farm

Details of income of last three years (Anmol dairy farm)

Year	No. of Total Animals	No. of Milching Animals	Gross Income (From Milk Products)	Expenditure	Net Income (From Milk Products)	Net income/ Milching Animals	Remarks (Extra income from Value addition)
2019-20	51	32	1845000	1350000	490000	15312	300000
2020-21	75	45	2490000	1630000	860000	19111	550000
2021-22	56	25	1800000	1200000	600000	24000	1000000
2022-23	70	29	2100000	1300000	800000	27586	1150000

Awards:

1) District level Best Pashupalak Award, Department of Animal Husbandry, Gov.Gujarat, District Panchayat Narmada, Year-2017

2) Progress Farmer award, District administration, District Panchayat Narmada, Year-2018

3) Noble performance certificate in the field of animal husbandry, District administration, District Panchayat Narmada, Year-2018

4) State level Best Pashupalak Award (Second prize), Department of Animal Husbandry, Government Gujarat-2021

5) Best khedut putra sanman in 2022 in collaboration with KVK and Jan Kalian Sewa Trust, Rajpipla.

LEAD PAPER

LP 1.1

Role of APMC in technological interventions in horticultural marketing in India: New initiatives and challenges

Narendra Singh and O. P. Sharma

N. M. College of Agriculture, Navsari Agricultural University (NAU), Navsari, Gujarat

Email: ns_manohar@rediffmail.com

Background

The present marketing system is characterized with long, fragmented supply chain, high wastage, low share of producers in price spread, is unable to meet the growing demand of quality and hygienic fruits and vegetables. This might be due to weak post harvest infrastructure and inadequate marketing support to the farmers. An efficient agricultural marketing is essential for the development of the horticulture sector as it provides outlets and incentives for increased production, the marketing system contribute greatly to the commercialization of subsistence farmers. Worldwide Governments have recognized the importance of liberalized horticulture markets. Task Force on Agricultural Marketing Reforms set up by the Ministry has suggested promotion of new and competitive Agricultural Market in private and cooperative sectors to encourage direct marketing and contract farming programmes, facilitate industries and large trading companies to undertake procurement of agricultural commodities directly from the farmer's fields and to establish effective linkages between the farm production and retail chains. There is a necessity to integrate farm production with national and international markets to enable farmers to undertake market driven production plan and adoption of modern marketing practices.

Status of horticulture in India

India has witnessed voluminous increase in horticulture production over the last few decades. Indian horticulture made significant progress in area expansion resulting in higher production. India is currently producing about 320 million tones of horticulture produce and horticulture production has surpassed the food production in the country. Over the last decade, the area under horticulture grew by about 3% per annum and annual production increased by 5.4%. During 2019-20, the production of horticulture crops was about 320 million tones from an area of 25.6 million hectares (Table 1).

Fruits and vegetables account for nearly 90% of total horticulture production in the country. India is now the second largest producer of fruits and vegetables in the world and is the leader in several horticultural crops, namely mango, banana, papaya, sapota, acid lime, aonla, cashew-nuts, areca nut, potato and okra. Per capita availability of fruit to the Indian population is 189 gm/ person/ day and has been helping in supplementing nourishment security. Productivity of vegetables in India continues to be low compared to world average productivity Per capita availability of vegetables in India is 357 gm/person/day, which is helping in fighting malnutrition. India is second largest producer of vegetables after china and is a leader in production of vegetables like peas and okra. Besides, India occupies the second position in production of brinjal, cabbage, cauliflower and onion and third in potato and tomato in the world. India is the largest producer and exporter of spices in the world. Noticeable advancement has been made in recent years in flower production, particularly, cut flowers, which has potential for exports. Horticulture contributes about 30% of GDP in agriculture, using only 17% land area. Horticulture exports valued at Rs. 28,260 crore in 2017- 18. Area under horticulture increased 29% in 8 years, from 18.7 million ha in 2005- 06 to 24.9 million ha. in 2016-17 as more farmers are venturing into horticulture in their quest for diversification in agriculture. Horticulture production increased from 167 million tones in 2004- 05 to 320 million tonnes in 2019-20.

Table 1: Trend in area, production and yield of horticultural crops in India

Years	Fruits			Vegetables			Total Horticulture		
	Area (000 ha)	Production (000 Tones)	Yield (Tones/ ha)	Area (000 ha)	Production (000 Tones)	Yield (Tones/ha)	Area (000 ha)	Production (000 Tones)	Yield (Tones /ha)
1991-92	2874	28632	9.96	5593	58532	10.47	12770	96562	7.56
2001-02	4010	43001	10.72	6156	88622	14.4	16592	145785	8.79
2002-03	3788	45203	11.93	6092	84815	13.92	16270	144380	8.87
2003-04	4661	45942	9.86	6082	88334	14.52	19208	153302	7.98
2004-05	5049	50867	10.07	6744	101246	15.01	18445	166939	9.05
2005-06	5324	55356	10.4	7213	111399	15.44	18707	182816	9.77
2006-07	5554	59563	10.72	7581	114993	15.17	19389	191813	9.89
2007-08	5857	65587	11.2	7848	128449	16.37	20207	211235	10.45
2008-09	6101	68466	11.22	7981	129077	16.17	20662	214716	10.39
2009-10	6329	71516	11.3	7985	133738	16.75	20876	223089	10.69
2010-11	6383	74878	11.73	8495	146554	17.25	21825	240531	11.02
2011 12	6705	76424	11.4	8989	156325	17.39	23243	257277	11.07
2012-13	6982	81285	11.64	9205	162187	17.62	23694	268848	11.35
2013-14	7216	88977	12.33	9396	162897	17.34	24198	277352	11.46
2014-15	6110	86602	14.17	9542	169478	17.76	23410	280986	12
2015-16	6301	90183	14.31	10106	169064	16.73	24472	286188	11.69
2016-17	6480	92846	14.33	10290	175008	17.01	24925	295164	11.84
2017-18	6506	97358	14.96	10259	184394	17.97	25431	311714	12.26
2018-19	6597	97967	14.85	10073	183170	18.18	25433	310738	12.22
2019-20*	6664	99069	14.87	10353	191769	18.52	25661	320479	12.49

Source: Horticulture statistics at a glance, 2018, NHB, Govt. of India
*2nd Advance Estimate 2019, NHB, Govt. of India

Marketing system of horticultural crops

Marketing of horticultural crops is quite complex and risky due to the perishable nature of the produce, seasonal production and bulkiness. The spectrum of prices from producer to consumer, which is an outcome of demand and supply of transactions between various intermediaries at different levels in the marketing system, is also unique for fruits and vegetables. The present marketing system of horticultural produce in the country, particularly for fruits and vegetables, lacks system approach. Producers have often failed to realize expenses incurred their transportation to markets, let alone the cost of production and capital investment, during the period of glut. Fruit and vegetable growers are receiving only a small part of price paid by the consumers as lion's share is being taken by chain of middlemen. The high profit margin of intermediaries is quite disproportionate to their services.

An Efficient Marketing System Can Reduce post-harvest losses, Enhance farmers' realization, Reduce consumer price, Promote grading and food safety practices, Induce demand-driven production, Enable higher value addition. Facilitate export. There has been concern in the recent years regarding the efficiency of marketing of fruits and vegetables in India. It is believed that poor efficiency in the marketing channels and poor marketing infrastructure is leading not only to high and fluctuating consumer prices, but also to only a small proportion of the consumer rupee reaching the farmers. The regulated wholesale markets can help in improving the efficiency by measures such as increasing the direct contact with the farmers, increasing the number of buyers and sellers in the market, promoting the use of open auction at the market, and improving/ adding facilities and services such as go-down, cold storage, weighing, and transparency and access to internal and external market information.

Existing market models for marketing of horticultural crops

1. Regulated markets (APMCs):

Agricultural Markets in most parts of the country are established and regulated under the State APMC Acts. The whole geographical area in the State is divided and declared as a market area wherein the markets are managed by the Market Committees constituted by the State Governments. Once a particular area is declared a market area and falls under the jurisdiction of a Market Committee, no person or agency is allowed freely to carry on wholesale marketing activities.

Role of APMC's in F&V Marketing

Majority of the fruits and vegetables in the country including India are currently marketed through the *"open market transactions system"* under the conventional APMC regulations. Market yards set up under the APMC Acts are playing a vital role in terms of price discovery, as well as product aggregation and disaggregation along the chain. Increasingly being replaced by contract farming and direct purchase from growers, traditional wholesale (APMC) markets are still important for small retailers and small growers.

Constraints in Existing F&V APMC's

The basic objective of market regulation is to regulate the trade practices, increase market efficiency through reduction in market charges, elimination of intermediaries and to protect the interest of producer-seller. Although regulation of the markets has improved their functioning and has helped in reducing the multiple trade charges and levies on producer seller, verification of accurate weights and scales, establishment of market committees in which the producer is given due representation, Judicious \utilization of market funds, fair settlements of disputes, arrangements for better storage facilities, market intelligence etc, the existing machinery has failed to check trading malpractices and has made the horticultural produce marketing system highly restrictive and inefficient. There are a large number of domestic market distortions, which have had a negative impact on development of this sector. Following marketing constraints are observed during the disposal of F&V produce in APMC's.

i. Poor Backward and Forward linkages of APMCs with producers as well as agro processing industries.
ii. Long marketing chains and clumsy transfers, result in substantial leakage of value and physical loss.
iii. Numerous intermediaries widely spread, increase the cost to consumer but not the value received by the producer.
iv. Lack of modern warehousing and cold storage facilities.
v. Local brokers are often in collusion with Arhatiyas and therefore the price which is settled is generally to the advantage of the Arhatiyas and not to the farmer.
vi. Lack of vision, professional competence etc. restricts the development of APMCs and increases the corruption and malpractices.
vii. Existing markets do not play a pro-active role in attracting produce. There is hardly any facility/infrastructure for handling, assembling, sorting, grading, packing, transportation, quality certification, labeling, pre -cooling, cold storage, ripening chambers etc.
viii. Lack of transparency in auction of horticulture produce, absence of real-time, truthful market information regarding price and arrivals of produce.
ix. Business process adopted by the market committees is generally insensitive to perishable nature of fresh horticulture produce.
x. Difficult to maintain traceability of the produce, one of the important requirements in export markets.
xi. Very few agriculture produce markets are specially designed for dealing with fresh horticulture produce that are highly perishable in nature and require proper handling, efficient sales, proper storage and further transport.
xii. The regulated markets were expected to plough back their revenue earnings into development of crop specific infrastructure; however, to the contrary, these markets have, over a period of time, acquired the

status of restrictive and monopolistic markets and have not developed crop specific infrastructure and business process.

Reforms in F&V APMC's:

The government has initiated some fundamental reforms to remove the inefficiencies in the traditional agriculture including horticulture value chain to benefit the farmers. In order to increase the income of farmers and promote the role of private sector in the agriculture including horticulture, a model APMC act was introduced by Ministry of Agriculture in 2003. The draft model legislation titled the State Agricultural Produce Marketing (Development and Regulation) Act, 2003, provided for establishment of Private Markets/ yards, Direct Purchase Centres, Consumer/Farmers Markets for direct sale and promotion of Public Private Partnership in the management and development of agricultural/horticulture markets in the country. The ministry of Agriculture, Govt. of India has come up with another model act, the Agricultural Produce and Livestock Marketing (Promotion and Facilitation) Act, 2017, supposedly an improvement over the 2003 act. Among other things, the provision that has grabbed much attention is the removal of contract farming from the APMC domain to a separate model act of Agricultural Produce and Livestock Contract Farming and Services (Promotion and Facilitation).

New initiatives in marketing of horticulture produce:

Many growers, especially the new ones, are inclined to start production without giving any thought to the business of marketing. Good marketing is an absolute must for a successful horticultural enterprise. Some would even argue that it ranks higher in importance than production itself, especially for farmers planning to diversify. After all, of what good is a product if one cannot sell it for a profit? Diversification of crops entails familiarizing the farmers with creating new marketing systems for the new products. Existing marketing channels, very often, do not accommodate the producers of the new produce well, especially the small producers.

2. Alternative Marketing:

Formal research on alternative marketing mechanisms has been scattered and hard to access by producers. It is mostly experiential and unrecognized by the agricultural establishment and official information channels. Small farmers and grassroots farm groups are the most likely to develop and use innovative marketing methods. The assumption that farmers must either "get big or get out" is being challenged. By the emergence of alternatives, it is possible for innovative farmers to stay small or medium-sized and make a comfortable and successful living from agriculture.

Exploring Alternatives:

Sustainable farming, which received a boost following the farm crisis of the 1980s, has given impetus to diversified, decentralized systems in which farmers take greater control of marketing by bypassing traditional channels and marketing directly to consumers at the local and regional level. Foods that do not require much processing before consumption—like fruits, vegetables and meat— are ideal for one-on-one marketing. Direct marketing is often quite unorthodox and may take the form of roadside stands, pick-your-own operations, farmers' markets, and sales to restaurants, upscale retail or specialty stores—even supermarkets and institutional food service. Prospects for direct farmer-consumer interaction are particularly promising at the rural-urban fringe, where producers can take advantage of specialty market niches and the demand for local and ethnic food and non-traditional products, while promoting agricultural tourism and education.

Alternate marketing channels

(a) Direct Marketing – Farmers' Markets: Direct marketing by farmers is being encouraged as an innovative channel. Some examples of these channels are Apni Mandi, Rythu Bazars, and Uzhavar Sandies. These channels are mostly adopted in sales transactions of horticultural commodities like fruits, vegetables and flowers which are highly perishable. In this channel, the produce move quickly from farmers to consumers due to lack of middlemen. If farmers directly sell their produce to the consumers, it not only saves losses but also increases farmers' share in the price paid by the consumer (Table 2).

Table 2 : Government initiatives for direct marketing of F&V in India

No	Marketing Institutions	Status/Key function
1.	Rythu Bazaar	The Rythu bazars were initiated by the Government of Andhra Pradesh on January 26, 1999. The number of Rythu Bazars have increased from 49 to 102 and now cover nearly 40,000 farmers of 2,800 villages
2.	Apni Mandi	Punjab's and Haryana's Apni Mandi (Our Market), establis hed in the mid-1990s, and were the first ones directly linking vegetable producers and consumers. Farmer producers brings their produce for sale directly to the buyers or consumers.
3.	Uzhavar Sandhai	Uzhavar Sandhai initiated in Nov 1999 to establish direct contacts between farmers and consumers in Tamil Nadu.
4.	Hardaspar Vegetable Market	Hadaspar vegetable market is a model market for direct marketing of vegetables in Pune city.This is one of the ideal markets in the country for marketing of vegetables
5.	Shetkari Bazar	Shetkari bazaars were established in the Maharashtra state for marketing of fruits and vegetables -It will eliminate middlemen, links producers and consumers directly, reduce price spread, and enhance producer share's in consumer rupee. Thus these markets increase the farm income, well being of the farmers and bring stability in prices of horticultural crops.
6.	Krushak Bazars	Government of Orissa established 40 Krushak Bazaars in year 2000-01. Government provides incentives for the purpose which include one or two acres of government land with all the infrastructure in the identified urban/semi urban area.-The purpose is to empower farmer-producer to compete effectively in the open market to get a remunerative price and ensure products at affordable prices to the consumer
7.	Mother Dairy Booths	Mother dairy, basically handling milk in Delhi. But it was asked to handle retail vegetable marketing. Mother dairy management has opened retail outlets in the city for providing vegetables to the consumers at reasonable prices.

Source: Report of the working group on agricultural marketing infrastructure and policy required for internal and external trade, Agriculture division, Planning commission, Government of India, January 2007

(b) Farmers' Organizations in Marketing **:** The need for cooperative marketing arose due to many defects in the private and open marketing system A Cooperative marketing society can eliminate some or all of the intermediaries, this Will make commodities cheaper and ensure good quality. Few Successful cooperative marketing societies for fruits and vegetables are Maha-grape-cooperative federation marketing, Maharashtra, Cooperative marketing pomegranate, Co-operatives marketing banana in Jalgaon district, Vegetables co-operatives in Thane District, HOPCOMS, Bangalore and Amalsad and Gandevi cooperative marketing societies, Gujarat.

Maha Grapes:

In order to boost the export of grapes from Maharashtra, "MAHAGRAPES", a co-operative partnership firm has been establish on 19th January, 1991 with the help of the Maharashtra State Agricultural Marketing Board, Pune. The head office of Mahagrapes is located at Pune and16 Grape Grower Co-operative Societies are the member societies of Mahagrapes from Sangli, Solapur, Latur, Pune and Nasik area. Main objective of Mahagrapes is to boost the export of grapes for which facilities like pre-cooling and cold storages has been erected at each grape grower co-operative society.Due to hard working of 'Mahagrapes' in the grape export, brand of Maharashtra's Grapes is well establish in the international market. Mahagrapes is established brand in the EU and Middle East market during last ten years.

Amalsad and Gadat Co-operatives in South Gujarat

The Amalsad co-operative was registered in 1941. It has a membership of 7934 of which 2997 are active members. Out of the total business of about Rs. 19.75 crore for fruits such as mango and sapota. Similarly, the Gadat co-operative, registered in 1944, has 3152 members of whom about 1800 are active members. The co-operative covers 800 hectares across 7 villages. Like Amalsad, it has sapota as its main business though banana and mango are also procured. Out of a turnover of Rs. 4.075 crore, sapota accounts for as much as Rs. 4 crore. It also has tried selling mango pulp under the brand names of 'Tripti' and 'Amidhara'.

HOPCOMS, Banglore:

The present HOPCOMS was established as 'The Banglore Grape Growers' Cooperative Marketing and Processing Society Ltd.' (BGGCOMS) on 10th September, 1959 with the main objective of encouraging grape vine cultivation by providing the required inputs, technical know-how, marketing facilities etc. The society started handling fruits and vegetables apart from grapes from the 1965. In 1983, the name of the society was changed as 'The Banglore Horticultural Producers' Cooperative Marketing and Processing Society Ltd. (BHOPCOMS) and subsequently in 1987 it became HOPCOMS. The membership of the society consists of four categories viz. 'A' class members, who are the producers of horticultural crops in the area of operation; 'B' class members, who are admitted as associate members and include cooperative institutions; 'C' class earmarked for the Government of Karnataka; and 'D' class members comprise traders and commission agents.

Modern Terminal markets:

Terminal Markets Complex (TMC) introduced as a new item under NHM is conceived to be set up in a Public Private Partnership (PPP) mode. It is designed to be set up in the form of hub and spoke model. It has provision of equity participation by Producers Association up to 26% of the total equity in the TMC. Approval has already been accorded for establishment of TMC at Ahmedabad and Surat, on the basis of arrival quantities of fruits and vegetables and strategic locations for development.

Terminal market would endeavor to integrate farm production with buyers by offering multiple choices like electronic auctioning to farmers for sale of produce to exporter, processor and retail chain network. The Terminal Market would operate on a Hub-and-Spoke Format, where in Terminal Market would be Hub - linked to a number of collection centers (Spokes), located at key production centers in the State and growers will have easy access to nearest Terminal Market. Terminal Markets envisage offering a one-stop solution, starting from facility for cleaning, grading, sorting, packaging and palletization of fresh horticulture produce. It will also provide logistic support including transport services, cool chains support and facility for storage (including ware houses, cold storages, ripening chambers, and storage shade etc).

(c) Contract farming : Contract farming can be defined as a system for the production and supply of Agricultural/ Horticulture produce by primary producers under advance contracts, the essence of such arrangements being a commitment to provide an horticultural commodity of a type, at a specified time, specified price and at a specified quantity to a known Buyer. Contract Farming is becoming an increasingly important aspect of agribusiness, whether the products are purchased by multinationals, smaller companies, Government agencies, Farmer Cooperatives or individual entrepreneurs. Contract Farming concept, has, however, gained importance in recent times in the wake of the economic liberalization process. There are number of contract farming companies engaged in Contract Farming such as Agrocell Corporation Ltd., Atreyas Agro Organic Pvt. Ltd., Godrej Agrovet Ltd., Pepsi India, ,McCain, Saraf Foods etc.

(d) Electronic Spot Exchanges: The spot exchanges create an avenue for a direct market linkage among farmers, processors, exporters and end users with a view to reducing the cost of intermediation and enhancing price realization by farmers. They also provide the most efficient spot price inputs to the futures exchanges. FTIL, MCX and NAFED joined together to set up National Spot Exchange Ltd. to

provide a nation-wide Electronic Trading platform. NSEL provides state of the art trading, delivery and settlement facilities which can be accessed from across the country.

- Help in realizing the best possible price at the time of sale for agricultural produce.
- An alternative market for sale of farm produce.
- Facilitate trade and payment guarantee

A pan India electronic market removes the inherent inefficiencies in the APMCs market and has proved that farmers realization has increased by 4-6% despite paying the market fees/cess etc. to the APMCs.

(e) Safal market: NDDB started a fruits and vegetable unit of SAFAL at Bangalore was one of the first fruit and vegetable retail chain. NDDB has set up an alternate system of whole sale markets in Banglore as a pilot project. This market is a move to introduce a transparent and efficient platform for sale and purchase fruits and vegetables by connecting growers through Grower's associations

(f) E-NAM: Electronic National Agriculture Market (E-NAM) is envisioned as a unified national electronic market bringing interconnectivity to markers across the country. The E-NAM portal launched by the Centre in April 2016 has 45.4 lakh farmers and 451 mandies registered on it. E-NAM aims for integration of marketing process and flow of goods is to be achieved by bringing interconnectivity of markets through information technology. Small Farmers Agribusiness Consortium (SFAC) is the lead agency for implementing eNAM under the aegis of Ministry of Agriculture and Farmers' Welfare, Government of India.

(g) Organized retail markets for fruits and vegetables: Retailing in India is highly unorganized, fragmented and predominantly small and family owned business due to poor access to capital, technology and regulations. After liberalization in India there is consistent growth of organized retailing of f&V (Table 3 &Table 4)

Table 3 : Growth of India's Private New Liberalized Marketing Institutions

Year	Retail Markets	Ownership	Formats	Outlets	Locations
1971	Nilgiri's	Local (part ownership by Actis, U.K.)	Supermarkets, Convenience stores	40; plans for 500 stores by 5012	Major cities in south India
1986	Trinethra/ Fabmill	Local (Adityam Birla Group)	Supermarkets, Convenience Stores,	170	A.P, Tamil Nadu, Karnataka and Kerala
1994	Margin Free	Local Cooperative (Consumer Protection and Guidance Society)	Discount Stores, Supermarkets	350	Kerala, Tamilnadu and Karnataka
1996	Spencers	Local (RPG Group)	Hypermarkets, Supermarkets, Convenience Stores	97; plans to add 50 hypermarkets by 2008	Major cities in south India
1997	Subhiksha	Local (Subhiksha Trading Services Pvt, Ltd)	Discount Stores	520; Plans for 1200 Stores all over the country by 2007/08	Major cities in Tamilnadu, A.P, Pondichery and Delhi region
1999	Food world	Local (Subsidiary of Dairy Farm International)	Supermarkets	55; plans to expand in South India	Bangalore, Hyderabad

2001	Trumart	Local (Pyramid Retail)	Supermarkets, Convenience Stores	29; plans for 90 stores by end of 2007	Maharashtra, Gujarat, Chennai, Bangalore, Hyderabad
2002	Food Bazaar	Local (Future Group)	Hypermarkets, Supermarkets	90; plans for 250 Store by 2010	National (Major metros and large cities)
2003	Metro Cash & Carry	Foreign (Metro AG, Germany)	Wholesale "Cash & Carry"	3; plans to add 15-18 new outlets by 2009	Bangalore, Hyderabad, Mumbai, Kolkata, Chennai
2004	My Dollar Store	Local (Franchisee of My Dollar Store of the US)	Convenience Stores	50; Plans for 400 Stores by 2007	Nation Wide
2004	Shoprite	Local (Subsidiary of Shoprite PTYO Ltd; South Africa)	Hypermarket	1; plans to add 2-3 new outlets by 2007	Mumbai
2004	Star India Bazaar	Local (Trent; Division of Tata Group)	Hypermarket	3; plans to add 23	Nation Wide
2006	Reliance Retail	Local (Reliance Industries Ltd.)	Hypermarket, Supermarkets, Convenience Stores	230; plans for 3,000 Stores, 2500 supermarkets and 500 Hypermarkets by 2010	Nation Wide
2006	Spinach	Local (Wadhwan Retail)	Supermarket	89; plans to aad 1500 stores in 90 cities by 2010	Nation Wide
2007	Max Hypermarkets	Local- foreign joint venture (Spar International, Neth.)	Hypermarket	Plans to develop 7 Stores by 2009	Nation Wide
2007	Bharti1	Local (Bharti Enterprises)	Hypermarket, Supermarkets	Plans to invest $2.5 billion by 20014	Nation Wide
2007	Bhart Walmart	Local- foreign joint venture (Wal-mart, USA)	Wholesale "cash &carry	Plans for 15 stores by 2014	Nation Wide
2007	Birla "More"	Local-Birla	Supermarkets	1000 stores $2 billion by 2010	Nation Wide

Source: http://crida.in/agrl_martng/ISAM/PDF%20FILES/T-II/Dastagiri.pdf

Table 4: Marketing Features of Models of Fruits and Vegetables under Different Supply Chains

SI No.	Items	Rythu bazaars	Reliance	Subhiksha
1.	Marketing model	Government acts as facilitator	Directly purchase from farmer.	Directly purchase from farmer.
2.	Farmers share in consumer rupee	prices are fixed higher than local retail shops but less than reliance and subhiksha markets	Higher share than Rythu Bazars	Higher share than Rythu Bazars

3.	Role of Middlemen	Partially and indirectly existing	Complete Elimination of Middlemen	Complete Elimination of Middlemen
4.	Consumer Status	Below Poverty Line people, Middle class, Village middle class	High income group, Software professional, metro people	High income group, Software professional, metro people
5.	Organization	Government	Private	Private
6.	Goal	No profit/loss	Commercial/profit	Commercial/profit
7.	Consumer choice of grading	No grading	Grading	Grading
8.	Prices	Prices	Low/high	More or less similar to reliance
9.	Marketing Channel	Farmer-government-consumer	Company-Farmer	Company-Farmer
10.	Participants	Farmers, unemployed women, self help group, unemployed youth Government Agencies: Civil Supplies corporation, OILFED, MARKFED, Girijana cooperative societies	Company	Company

Source: http://crida.in/agrl_martng/ISAM/PDF%20FILES/T-II/Dastagiri.pdf

New initiatives of operation green in India :

Operation Greens aims to promote farmer producers organisations, agri-logistics, processing facilities and professional management. The operation aims to aid farmers and help control and limit the erratic fluctuations in the prices of onions, potatoes and tomatoes. 'Operation Greens' launch on the lines of 'Operation Flood'. 'Operation Greens' shall promote Farmer Producers Organizations (FPOs), agri-logistics, processing facilities and professional management etc.

Suggested Policy Implications:

1. Mechanisms for making APMC's more Vibrant:

It is important to make our APMC more vibrant and strong in terms of infrastructure, management and transparency. It is also important to understand implications of FDI in retail for wholesale markets and traders/CAs and therein there is need for more efficient and lower cost APMC markets for F&V in India.

- Ensure open auction system(dual license of broker and wholesaler shouldn't be issued to the same person under any circumstances)
- There should be a proper checking that broker's fee should not be charged from farmers and it shouldn't exceed its prescribed limit.
- buyer competition with more licenses
- urgent need to upgrade the facilities(cold storage facility and the godown storage facility, weighting and handling facilities)
- e-payment of market fee,
- Producer Company representation in APMC management
- Denotification of CAs/Arthiyas like in MP,
- APMC markets are important for small farmers as they serve as competitors to contract and 'contact'

farming (practiced by retail chains) and can help improve the terms offered by retail chains to growers as contract/contact prices are benchmarked to APMC prices.

- Make warehouse receipts applicable to less perishable produce like potato/onions.
- Exempt F&V crops from APMC rules only for CF and Direct purchase.
- Encourage and invite private sector to invest in upgradation of APMC markets under PPP model and facility of viability gap funding should also be introduced from the government.
- For breaking the barrier of reluctance on part of traders/ wholesale buyers / exporters / processors to participate in business of modern markets it is necessary to introduce the *Standard Operating Procedure (SOP) for* modern markets being set up as well as for regulated markets set up under APMC Act, as part of Marketing Reforms.
- This will improve the functioning of existing regulated markets which will be compelled by business requirements to make investment in packing & grading, modern ware houses and electronic auction system.
- Introduction of Standard Operating Procedure (SOP) will pave the way for investment in Private Markets too.

Standard Operating procedure (SOP):

Under the reformed system, regulated markets will also have to undertake auction function themselves and register the buyers who shall be given a credit limit. Seller too will be required to get himself registered with a Market in which he wants to sell his farm produce so that his payment may be made through bank. After auction of produce, the seller may collect payment towards price of goods sold from the Market Committee. It will be for the management of market to collect payments from the wholesale buyers. This will definitely improve the functioning of existing regulated markets which will be compelled by business requirements to make investment in packing & grading, modern warehouses and electronic auction system.

Other policy implications

Permitting setting up Private Markets in Area of Operation of APMCs - so that there is a healthy competition for providing better services.

Freedom on Inter-state movement of horticulture produce: The government should keep all the taxes levied on inter-state movement of agriculture produce to the minimum. A scheme of green permit can also be introduced to reduce the checking time of the vehicle carrying agriculture produce. It can significantly reduce the post-harvest losses caused during transportation and multiple handling.

Public Private Partnership (PPP) Approach - for sustainable development of APMCs

To develop the integrated Horti-value chain, linking various stake holders of horticulture market the Public Private Partnership approach can provide a better platform. Patel et al. (2007) suggested the "Integrated Agro-Bridge Center" under PPP approach to fulfill the horticulture input requirement but also provide better and efficient agriculture produce market. Successful replication of PPP models across various production hubs for key commodities can lead to the evolution of Indian horticulture from inefficient, supply driven, low value business scenario to an organized, high-tech, demand-led and high-value orientation.

"Integrated Agro-Bridge Center" would be the joint venture of APMCs and Private investors to strengthen the agri-value chain. The APMC would facilitate the land as part of its equity and the private investor would develop other infrastructure. Both the partners would likely to follow the policies by the government in their functioning. The center would get the membership charges from the group of farmers in respective areas. The research institutes, KVKs, Universities, and NGOs would be the knowledge partners of the model. This segment would provide the extension services consistently.

Thus, the PPP model would provide the multi-user facilities and establish an integrated agro-value chain, which would amplify the agriculture operational efficiency. Even the private players would also get the benefit due to well-organized structure of the market.

Market information system and market Intelligence

The use of Information and Communication Technology in providing critical information about prices in various markets, weather forecast and prices of inputs can greatly help the farmers to take informed decisions.

Market Information in respect of agriculture including horticulture produce is collected by Directorate of Agriculture Marketing, DAC, the Government of India through AGMARKNET Project. Under this project, market price and arrival is collected by mandi staff and uplinked on AGMARKNET portal. In the present scenario it is not possible to get real time, truthful data regarding commodity arrival and price for horticulture produce and generation of Market Intelligence remains a distant reality. The price quotations are not backed by grades and the information is available with considerable lag. Quite often, a range of prices is made available, which is of little use to farmers. Thus, Introduction of SOP can facilitate generation of real time, truthful market information and market intelligence for horticulture produce. Developments in information technology need to be tapped for wider dissemination of market information.

Direct market access by growers' association

Organization of the farmers into growers' groups/commodity groups /cooperatives/self help groups/producer. Such groups can initiate local packaging and grading mechanisms and selling directly**.** Incentives such as transport subsidy for movement of horticulture produce from villages to urban wholesale markets, basic training for proper packaging, giving land or facilitation in opening of farmers markets etc. The farmer's associations can also be encouraged by some private players. Mother Dairy Fruit and Vegetable venture SAFAL procures fresh fruits and vegetables directly from farmers associations and sells it in urban retail markets.

Compulsory buying of horticulture produce directly from farmers for organized retail players

It should be mandated by law that organized retail players should buy horticulture produce directly from farmers instead of urban wholesale markets. The compulsory buying of the horticulture produce directly from farmers has multi-level benefits for farmers, consumers and companies as well. Direct procurement from farmers first of all creates more options for farmer to sell their produce. Secondly, it will automatically lead to the development of private horticulture value chain or modern horticulture value chain which will be free from various inefficiencies in traditional horticulture value chain. Thirdly, it has the potential of significantly controlling the post-harvest loss especially in horticulture commodities. Lastly, it can lead to better profitability realization both for farmers and organized retail players in long run.

Conclusion

India is now the second largest producer of fruits and vegetables in the world and is the leader in several horticultural crops, namely mango, banana, papaya, cashew-nuts, areca nut, potato and okra. India is the second largest producer of fruits and vegetables globally. APMC reforms are taking place, however the pace of the reform process and implementation is very slow. There is urgent need that government now should facilitate the development of new horticulture value chain by the private sector which reduces the involvement of middlemen to minimum and remove existing economic inefficiencies. This will facilitate all round development of horticultural marketing by facilitating development of marketing infrastructure through private sector investments and create avenues for alternate marketing channels for farmers for sales transactions of their produce where prices are remunerative to them. A dynamic and vibrant marketing system with adequate supply chain infrastructure has been felt necessary to keep pace with the changing horticulture production and growing market surplus.

References

Arya, Anita. (1993). Agricultural Marketing in Gujarat, Concept Publishing Co. Ltd., New Delhi.

Gandhi, V. & Namboodiri, N.V. (2006). Fruit and vegetable marketing in India: Consolidated study of wholesale markets in Ahmedabad, Chennai and Kolkata. CMA publications No. 221. Indian Institute of Management. Ahmedabad

http://apeda.gov.in/apedawebsite/

http://crida.in/agrl_martng/ISAM/PDF%20FILES/T-II/Dastagiri.pdf

http://nhb.gov.in/Statistics.aspx?enc

https://currentaffairs.gktoday.in/tags/operation-green

Mittal, S. (2007). Strengthening Indian Agriculture: Need for Reforms", Draft Paper for presentation at the Seminar on "US-India Agricultural Knowledge Initiative" organized by ICRIER and Ministry of External Affairs, Government of India.

Pachouri A.,(2012),Economic Inefficiencies in Farm-Market Linkages in Agriculture Value Chain in India: Problems and Solutions ,ISAS Working paper No.163-28,December,2012

Pandey, M., Sudhir, K, Tewari. D. & Nainwal N. (2010). "The Roadmap: Linking small farmers to markets", Policy paper prepared for Gates Foundation.

Patel A, Sharma M and Pandya M. (2007) Public Private Partnership (PPP) Approach – for sustainable development of APMCs in Gujarat, Paper presented at Conference on Global Competition & Competitiveness of Indian Corporates

Patnaik, G.(2011). Status of Agricultural Marketing Reforms - IGIDR Proceedings/Projects Series- PP-069-11b, Worshop at India International Centre, New Delhi

Report of Horticulture Statistics at Glance 2017, NHB, Govt. of India, New Delhi.

Report of the working group on Horticulture and plantation crops for the Twelveth Five year plan 2012-17 Agriculture Division, Planning Commission, Government of India, 2011.

Report of the working group on Horticulture and plantation crops for the Eleventh Five year plan 2007-12 Agriculture Division, Planning Commission, Government of India, 2007.

LP 1.2

Poetic Extension Education: An Innovative Approach

Samares Kumar Das
Assistant Professor (selection grade), Department of Veterinary & Animal Husbandry Extension,
College of Veterinary Sciences & Animal Husbandry, Central Agricultural University (Imphal),
Jalukie, Peren, Nagaland, PIN 797 110
E-mail: samcau.d1@gmail.com

"…Extension education is the process of teaching rural people how to live better by learning ways that improve their farm, home and community institutions… (However), the importance of the extension of knowledge through educational procedures versus the discovery of knowledge through research procedures is not yet fully realized…"

- J. Paul Leagans, *Father of Extension Education* (1961)

Introduction

The word "extension" is derived from two Latin words-*ex* meaning "out" and *tensio* meaning "stretching". So, the literal meaning of "extension" is "stretching out".

Applying the principles of "learning by doing" and "seeing is believing" extension education is "helping people help themselves shape their behaviour (knowledge, attitude and skill) in desired direction".

According to Niels Rolling (1982), "extension" refers to the actual work done by professional extension personnel, while "extension education" refers to the body of knowledge concerning that actual work.

James Stuart is regarded as the "father of university extension", J. Paul Leagans is regarded as the "father of extension education", and Seaman A. Knapp is regarded as the "father of demonstration".

History of Extension

The term "university extension" was first used in Britain during the 1840s. In 1867-68, James Stuart-a fellow of Trinity College, Cambridge—first delivered lectures to women's associations and working men's clubs in England.

In 1873, Cambridge University first used the term "extension education" to describe an educational innovation. During the 1880s, the innovation was referred to as the "extension movement" when the universities began activities beyond the campus.

Thus, "extension education" has evolved from "university extension" through educational innovation and extension movement in the nineteenth century UK to "agricultural extension" in the twentieth century USA to increase agricultural production.

In India, agricultural extension began with the establishment of the first agricultural university (1960) - the G. B. Pant University of Agriculture & Technology, Pantnagar (Uttarakhand) - on the pattern of the Land Grant Colleges in the USA with the financial support from Rockefeller Foundation.

Extension education of antiquity

With a history of nearly four-thousand-year, back to the Chinese Hunan Dynasty, modern extension education began with advocating for better farming and homemaking pioneered by a singer, poet and farmer—Thomas Tusser (1524-80) —in Tudor England.

He was first to compose and publish advice on crop and animal husbandry including housewifery in verses titled, *A Hundred Good Points of Husbandry* (1557), expanded to *Five Hundred Good Points with as Many on Good Housewifery* (1573).

Here are examples from Cambridge Library Collection, *Five Hundred Points of Good Husbandry Together with a Book of Housewifery* by Thomas Tusser (Edited by William Fordyce Mavor, 1812, Cambridge University Press, 2013, p. 103):

Trench meadow and ridge;
Dyke, quickest, and hedge.
Top lots not full;
Add bramble and hull.
Rid barley all now;
Clean out of thy mow.
Choice seed out draw;
Give cattle the straw.

Similar way of advising better farming and homemaking existed long before Thomas Tusser in rural Bengal, perhaps in other parts of the Indian subcontinent. There was a legendary woman, named Khana, with prodigious talent.

Khana's advice in couplets has become famous as *Khanar Bachan* (Words of Khana). Over time, Khana's words have become prophecies on farming, homemaking and every aspect of life acquiring the status of an oracle.

However, there is no concrete proof of her existence. Perhaps, the folk wisdom transmitted from generation after generation, hallmarked by some prodigious talents, is known as Khana's prophecy which was written between the ninth and twelfth century. Here are examples of Khana's words:

Thaakte balad na kare chaash;
Taar dukkho baro maash.

(In spite of having oxen who does not plough, his misery lasts throughout the year, i.e. lethargy is the cause of misery).

Faagune aagun chaite maati;
Tabei baansher paripati.

(Bamboo grows well in fiery February-March and dusty March-April).

Popular science

Nearly two centuries ago, "popular science" did not exist. Scottish mathematician, Mary Fairfax Somerville (1780-1872), pioneered popular science in her book-*On the Connexion of the Physical Sciences* (1834)-to describe the modus operandi of a "scientist".

Science and society are intertwined. Bringing science to the doorstep of the common man is the essence of extension education. To achieve this extension education has to play the role as reflected in the words of Swami Vivekananda:

"Why should not education go from door to door…If a ploughman's boy cannot come to education, why not meet him at the plough, at the factory, just wherever he is? Go along with him, like his shadow."

Science is useless if not understood and applied by the common man. Extension education is a means of communicating science. Knowledge of the evolution of agricultural extension from practical advice on farming through poetry to "diffusion of innovation" through "transfer of technology" is useful for extension educators.

A leaflet (single sheet of paper containing preliminary information on a particular topic) titled, *Tips for Pigs* is appended herewith as an example of poetry for disseminating scientific information among the farming community.

Research and Extension

Research and extension is inseparable. They go hand-in-hand. They are two sides of the same coin. Extension education begins with the analysis of present situation, identifying people's interests and needs, deciding about objectives, finding out best course of action to meet the objectives, evaluating the results, and reconsideration.

Principles of people's participation, leadership, trained specialist, applied science and democratic approach should be practised throughout the process with education as means and ends. But in practice people's needs are rarely assessed, their participation is misrepresented, and principle of education and democratic approach is wrongly interpreted and applied.

Consequently, a few genuine researches are conducted to solve problems of the farmers. All leave the actual solving of farmers' problems to someone else. Hence, we hear of "poor extension services" and "backward farmers".

Due to a lack of knowledge of farmer's situation research remains largely a duplication which does nothing but adds to the publication. This practice has abandoned the philosophy and principle of Extension Education-"helping people help themselves shape their behaviour in desirable direction".

Research in isolation is useless for farming community. Only need-based applied research and extension of the same in farmers' situation is useful. Instead of two separate committees, there should be one "Research & Extension Advisory Committee" comprising all academic departments of the college.

Conclusion

People should be instilled with a scientific attitude. Research and extension are intertwined. Knowledge and university-generated innovation are of no use if they are not disseminated. Drawing and sketching are effective means of popularising science and brining the same to the doorsteps of the common man.

Science seeks to explain the mystery and magic. Poetry searches for beauty in the mysterious and the magical. Poetry can be used to communicate science in popular form. Extension education should use poetry for disseminating complex information and knowledge discovered and invented through research.

References

Das, S. K. 2015. Cattle tattle. Postscript, *Economic & Political Weekly*, 21 November, p. 93-94.

Das, S. K. 2021. Success of science. Letter, *The Statesman*, 3 October, p. 6.

Ghosh, P. 2017. The tragedy of Khana. *The Statesman Festival*.

Holmes, R. 2014. In retrospect: On the connexion of the Physical sciences. *Nature*, 22 October, p. 432-433.

Illingworth, S. 2019. Use poetry to share your science. *Nature*, 17 October, p. 442-443.

Jones, G. E. and Garforth, C. 2005. The history, development, and future of Agricultural Extension. In: Swanson, B. E., Bentz, R. P. and Sofranko, A. J. (Eds.) *Improving Agricultural Extension: a Reference Manual*. Food and Agriculture Organization, Rome.

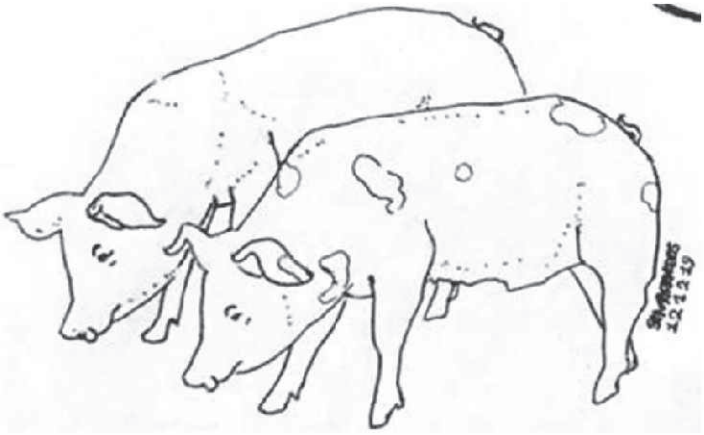
Leagans, J. P. 1961. Extension education for community development. In: *Extension Education in Community Development*. Ministry of Community Development, Government of India, New Delhi.

Rhoades, R. 1989. The role of farmers in the creation of agricultural technology. In: Chambers, R., Pacey, A. and Thrupp, L.A. (Eds.) *Farmer First: Farmer Innovation and Agricultural Research*. IT Publications, London, p. 3-9.

Schmidt, L. B. 1930. The agricultural revolution in the United States: 1860-1930. *Science*, 12 December, p. 585.

van den Ban, A. W. and Hawkins, H. S. 1998. *Agricultural Extension.* CBS Publishers & Distributors, New Delhi.

Tips for Pigs



Piglets are future of the farm;
Take care of them, confirm.
Clean the newborn
Soon after they are born.
Cut navel cord two-inch away;
Dip in iodine solution anyway.
When delivery of all piglets is over,
Help them suckle sow's milk, forget never.
Piglets are born with sharp “needle teeth”;
Trim them at the age of one to two-week.
Piglets are susceptible to cold;
Keep in warm enclosure until old.
Piglets suffer from iron deficiency;
Feed “anaemia paste” definitely.

Access to grass and soil
Prevents “piglet anaemia” as well.
Select sow and boar typical breeds of their;
A sow with a history of large litter.
Feed adequately and properly.
De-worm and vaccinate regularly.
Complete and balanced feed with concentrate
Can be prepared at home as proportionate.
It is economic to feed cooked garbage
Fortified with little home-made concentrate.
Do standing test in estrous sow;
Right time to inseminate now.
Do artificial insemination
Using glove-hand method of semen collection.
Fill AI gun with boar semen;
Insert with bulb upward remain.

Composed & illustration by :
Author AI : Artificial insemination

LP 1.3

Agricultural marketing: Major reforms and policies

Soumya C[1], K. P. Thakar[2], R. M. Jadeja[3], Pankaj Kumar Ojha[4] and Parul M. Patel[5]

[1]Assistant Professor, Department of Agricultural Economics, SDAU, Sardarkrushinagar

[2]I/c Professor & Head, Department of Agricultural Economics, SDAU, Sardarkrushinagar

[3]Associate Research Scientist, Agricultural Research Station, SDAU, Bhachau

[4]Assistant Professor, Banda University of Agriculture And Technology, Banda, UP

[5]Ph.D. Scholar, Department of Agricultural Economics, SDAU, Sardarkrushinagar

Introduction

India is a country which is blessed with abundant natural resources. In India, majority of the population is dependent upon agriculture for its livelihood. Agriculture contributes about 16 percent to GDP of the country at current prices and provides employment to more than 50 percent of population of the country. According to estimates, agriculture, forestry, and fishing contributed Rs 19.48 lakh crore (US$ 276.37 billion) to gross value added during the financial year 2020-21 (Agricultural and Processed Food Products Export Development Authority - APEDA, Department of Commerce and Industry, Union Budget, 2021-22). Most of the farmers in India are marginal and small farmers who have lesser area under cultivation. The farms in India are scattered in different parts of the country and each of them are different with the others with respect to agro – ecological conditions and resources. These factors make it more difficult for the farmers to get access to the real time information thus hampering them from getting higher prices for their produce. The middlemen exploit this situation and makes higher profits which lowers the farmers share in consumer's rupee. The middlemen is a critical link in the agricultural marketing because he makes up for the lack of infrastructure i.e., physical, social and institutional infrastructure which are faced by the farmers (Soumya *et. al*., 2018).

Agricultural marketing involves the movement of goods and services from farm to the end consumer. Agricultural marketing assumes significance not only to meet the food and nutrition needs of the country, but also to support the growth of the economy as a whole (Acharya & Agarwal, 2011). In India, agricultural marketing over the years have become complex, dynamic and competitive. Today, agricultural marketing has become more consumer oriented and the farmers and the middlemen involved in the marketing chains are now producing and moving the produce according to the consumer's requirements. In India, agricultural sector has come up with many reforms and policies in the agricultural marketing.

They are as follows:

Major reforms and policies in agricultural marketing

1. APMC (Agricultural Produce Market Committees)

The main objective of setting up of APMC's was to protect the farmers from exploitation of traders and to create a place for trading of farm produce where farmers and buyers can meet. The APMC's also focussed on creation of infrastructural facilities like storage godowns, amenities for the farmers coming into the market like drinking water, cattle shed etc. Later regulated markets were established. APMC's provide the legal support to the farmers. In case of any complaints, market committees were there to solve the problems.

The problem within the APMC system was that farmer comes under a certain notified market area were compelled to sell their produce in the designated APMC itself which hindered them from selling in another market where it is profitable. The traders in the APMC's formed the cartels which prevented other buyers from entering the market. APMC's also failed in creating better infrastructural facilities like storage facilities. The farmers who produced fruits and vegetables were unable to sell in the markets created by APMC's. As a result, most of the farmers started to sell outside the markets of APMC's where they get nearly about the same prices (Agriculture Marketing An Overview and Way Forward, 2017).

Model APMC Act, 2003

Model APMC Act was proposed by Ministry of Agriculture, Government of India in the year 2003. According to the Economic Survey of 2014-15, the Model APMC Act of 2003 has provisions for:

(1) Direct sale of farm produce to the sponsors of contract farming.
(2) Establishment of special markets for specified agricultural commodities such as perishables.
(3) Establishment of new markets for agricultural produce by farmers, consumers, or private persons in any area.
(4) Registration of market functionaries instead of licensing, which facilitates them to operate in the entire state.
(5) Single levy of market fee in the entire notified area.
(6) Establishment of producers' or consumers' markets to facilitate direct sale and purchase of agricultural produce.
(7) Investment of revenue earned by APMC for market infrastructure.

2. Price Stabilisation Fund

With the aim to decrease the price volatility of important agri-horticultural commodities like onion, potatoes and pulses which were also added subsequently, price stabilisation fund was set up in 2014-15 under the Department of Agriculture, Cooperation & Famers Welfare (DAC&FW) The commodities were buffer stored and they were released when prices become very high to regulate the prices under this scheme. The commodities were directly procured from the farmers for the buffer stock (Soumya *et. al*., 2018).

3. Direct marketing

This model helps in eliminating the middlemen thereby reducing the marketing cost and increasing the margin received by the farmer. This enables the direct contact between farmers and consumers which help the farmers to know the consumer choices and they can produce as per the consumer requirements. Examples are Punjab and Haryana (Apnimandis), Andhra Pradesh (Rythu bazar) and Tamilnadu (UzhavarSanthaigal). To increase the farmer's income, more direct marketing models should come up in different states of the country (Soumya *et. al*., 2018).

4. Producers Co - operatives

Producers co - operatives are the co – operative organisations formed by group of producer farmers who come together to help themselves. Producers co – operatives help the producers to market their produce and procure the inputs at lower cost. This helps in increasing the income of farmers by reducing marketing costs and achieving higher margins. Mainly, the marginal and small farmers are benefitted by this model. AMUL in Gujarat is a successful example of this model (Soumya *et. al*., 2018).

5. Model State/UT Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017

To maintain a uniformity in the reforms in agricultural marketing all over the country "Model State/UT Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017" **was proposed.** The important provisions of the draft model Act are:

(1) The entire State would be treated as a single market, doing away with the earlier notified area for an APMC
(2) The Market Committee and State Agricultural Marketing Board wouldbe fully democratized
(3) Enhancing competition for the farmers produce by providing conditions for creation of private wholesale markets and farmer-consumer market yards
(4) Reducing price spread by enabling direct contact between farmers and consumers or other end-user categories such as processors, exporters and so on
(5) Freedom to the farmer to sell his produce to any person or agency at any place of his choice which may fetch him better returns

(6) Declaration of warehouses, silos and other storage structures as markets or sub-market yards to enable direct linkage between the farmer and the buyer
(7) Promoting e-trading to link markets across geographies and make trade process transparent
(8) Single-point levy of market fee and single trading license across the state
(9) Create conducive conditions such as inter-state trading license, grading, standardization, and quality certification for promoting a nation-wide, single agricultural market

Some features of the Model APMC Act 2003 like provisions for special commodity market yard, rationalization of market fees and commission charges, etc. are retained (Agriculture Marketing An Overview and Way Forward, 2017).

Karnataka model for agricultural marketing

The state of Karnataka is pioneer in adopting these amendments and innovated its tendering process to bring transparency, competitiveness and efficiency in the regulated markets. The Karnataka state with the assistance of National Commodity and Derivative Spot Exchange (NCDEX) has replaced its manual tender system by electronic tender system for price bidding in selected regulated markets in the state. The plan aimed at vertical as well as horizontal integration of all regulated agricultural markets (APMCs) with supporting infrastructure for seamless flow of produce, finance and information across different stakeholders in the trading environment. The model was actualized through a joint venture of state government and NCDEX *i.e.* Rashtriya e-Market Services (ReMS) Private Limited Company. ReMS provides the package of services which include auction as well as post-auction facilities (weighing, invoicing, market fee collection, accounting); assaying facilities; warehouse-based sale of produce; commodity funding and price dissemination (Sinha and Kumar, 2010). The e-tender system was first introduced in 2006-07 on pilot basis for paddy in the Mysore regulated market, which was further extended to 11 commodities in 2010 *Agricultural marketing reforms and e-NAM* 171 (Chengappa *et al.*, 2012*)*. However, the unified online agricultural market initiative was launched in Karnataka on 22 February 2014. A total of 105 markets spread across 27 districts have been brought under the Unified Market Platform (UMP) as of March 2016 (Chand, 2016). This initiative provides a unique identification number to every lot brought by the farmers to the APMC market. The farmer can use the option of using either common platform or the platform of commission agent to auction his produce. The lots ready for auction are assayed for their quality and the information about quality and quantity is put on the portal of ReMS. The registered buyers or traders on ReMS who are interested in purchase of produce are required to get the unified market license. Any prospective buyer can bid for the produce online from anywhere using her/ his credentials with ReMS. A trader can revise the bid upward any number of times before closure of the bidding time. After closure of auction period, the bids are flashed on television screens put up in the mandies and on the portal of ReMS. Thereafter, the producer/seller is required to give his acceptance for the bid. A seller has the autonomy to reject the bid, in which case a second round of bidding takes place on the same day and in the same way. A bidder is required to keep a pre-bid margin of 5% of value of the lot marked for sale with ReMS before opening of the tender. ReMS charges 0.2% of the value of the transacted produce for providing various online services. The important feature of the model is that the participation in UMP is not restricted to Karnataka. Traders from other states and bulk institutional buyers (Cargill, ITC, Reliance, Metro Cash & Carry) are also registered with ReMS.

The UMP received overwhelming response from farmers in the state and it shows impressive results in a short period. Auction and sale of farm produce is not restricted to traders within the market. Thus, the possibility of tacit understanding to suppress prices received by farmers or cartelization has been eliminated (Bisen and Kumar, 2018).

6. e- NAM

The befitting achievements of Karnataka model received countrywide attention and allured some other states to imitate it. Andhra Pradesh, Gujarat, Maharashtra and Telangana were among the early adopters. With the overwhelming response of farmers to the new marketing method in Karnataka, the Union Government

took initiative to encourage other states to replicate similar model for trade in agriculture. The Cabinet Committee on Economic Affairs approved the central sector scheme for promotion on the national agriculture market through Agritech Infrastructure Fund with a budget allocation of Rs. 200 crores on July 1st, 2015. The scheme aimed at setting up of a common e- platform in 585 selected wholesale regulated markets across the country. It envisages expanding Karnataka's UMP model at the national level in a bid to cover the entire country. The Prime Minister of India has given a real push to the effort by launching the electronic trading platform for National Agriculture Market (e-NAM) on April 14, 2016.

A common market means a market within which there are no institutional or legal barriers to the free circulation of products, so that the producer or the traders can sell them with the same freedom across the state borders as they can within their own states (Roy et al. 2017). National Agriculture Market (NAM) is a similar pan-India electronic trading platform which networks the existing APMCs to create a unified national market for agricultural commodities. In reality, the common agricultural market like NAM can benefit different stakeholders engaged in value chain of agricultural commodities. The farmers can have benefits of wider choice of buyers for their produce which would positively influence their net income; consumers can also have more alternative for same product with varying prices and qualities; bulk buyers and exporters can reduce their intermediation cost by directly participating in trade without being physically present in the market and direct interface of bulk buyers with the sellers without any intermediation. Therefore, the efficiency of agricultural marketing system is expected to be increased with the NAM platform. Technically, NAM envisages spatial market integration, reduction in transaction costs and has direct implications on price signals and price discovery, farmer's income and market liberalization as well.

Spatial integration of APMCs and uniformity in price (excluding of transportation cost) across the markets will reduce the scope of arbitration by the traders which will create win-win situation for both the farmers and consumers (Bisen and Kumar, 2018).

e - NAM was announced on July 1, 2015 and this aimed in the setting up of a common e - platform in 585 selected wholesale regulated markets across the country by March 2018. e - NAM aims to integrate all the agricultural markets of the country into a common national market in which agricultural commodities will flow between the states without any interruption.

The features of e - NAM are:

(1) A national e - market platform for transparent sale transactions and price discovery in regulated markets, kisanmandis, warehouses and private markets. Willing states to accordingly enact provision for e – trading in their APMC act.

(2) Liberal licensing of traders/ buyers and commission agents by state authorities without any pre – condition of physical presence or possession of shop premises in the market yard.

(3) One license for a trader valid across all markets in the state.

(4) Harmonization of quality standards of agricultural produce and provisions of assaying (quality testing) infrastructure in every market to enable information bidding by buyers.

(5) Restriction of APMC jurisdiction to within the APC market yard/ sub yard of a geographical area (the market area at present).

(6) Single point levy of market fees i. e.in the first wholesale purchase from the farmer.

The states/ UTs who have fulfilled the following three conditions are eligible for trading under e - NAM.

a. A single license to be valid across the state

b. Single point levy of market fee

c. Provision for electronic auction as mode for price discovery.

Union Agriculture Ministry on February 2018 launched six new features of e - NAM platform with an aim to make it more users friendly.

(1) e - NAM mobile app

(2) BHIM payment facility
(3) New and improved website with eLearning MODULE
(4) MIS dashboard
(5) Grievance Redressal Management System
(6) Integration with Farmer Database (Kalamkar, 2017).

e - NAM will eliminate the cartels of traders and thus will increase the farmer's share in consumer's rupee. Consumers will get produce at a reasonable price and the price spread between different states will also get reduce through this. Better price realisation for farmers will serve as an important incentive for raising productivity and production, and in turn lead to higher growth of output. In many states, farm harvest prices prevail below the minimum support price (MSP) in the harvest period and shoot up subsequently. e-NAM will help check such market imperfections. Some states like Punjab and Haryana desperately need diversification in crop pattern away from paddy–wheat rotation. However, this has not been happening due to unattractive market for alternative crops. e-NAM is expected to promote market- driven diversification and reduce dependence of farmers in these states on MSP and public procurement (Chand, 2016).

Contract farming

Contract farming is recognised to be an effective mechanism to generate desired outcomes for farmers – price assurance, productivity enhancement, quality improvement and risk reduction. Frequently cited concerns such as delay in payments, price reduction, and undue rejections (Singh, 2013) are addressed in the Contract Farming Act though provisions for guaranteed price, institutional arrangements for registering written contract and dispute settlement mechanism. This is a win-win situation for both farmers and agribusiness firms. Farmers can get higher stable prices and firms can get the desirable quality produce at a reasonable price from the farmer directly. The farmers are also benefitted since they get required technical support, inputs and credit by the firms which help them to produce quality product thus helping them to get higher prices. Pepsi Co. in tomato, Appachi Cotton Company (ACC) in cotton are the successful models of this. By contract farming, farmers can get rid of the violent fluctuations of prices which is causing poor financial condition of our farmers.

7. The State /UT Agricultural Produce & Livestock Contract Farming and Services (Promotion & Facilitation) Act, 2018

The State /UT Agricultural Produce & Livestock Contract Farming and Services (Promotion & Facilitation) Act, 2018 was passed in the year 2018. The provisions of the act are:

- The Act lays special emphasis on protecting the interests of the farmers, considering them as weaker of the two parties entering into a contract.
- In addition to contract farming, services contracts all along the value chain including pre-production, production and post-production have been included.
- "Registering and Agreement Recording Committee" or an "Officer" for the purpose at district/block/ taluka level for online registration of sponsor and recording of agreement provided.
- Contracted produce is to be covered under crop / livestock insurance in operation.
- Contract framing to be outside the ambit of APMC Act.
- No permanent structure can be developed on farmers' land/premises
- No right, title of interest of the land shall vest in the sponsor.
- Promotion of Farmer Producer Organization (FPOs) / Farmer Producer Companies (FPCs) to mobilize small and marginal farmers has been provided.
- FPO/FPC can be a contracting party if so authorized by the farmers.
- No rights, title ownership or possession to be transferred or alienated or vested in the contract farming sponsor etc.

- Ensuring buying of entire pre-agreed quantity of one or more of agricultural produce, livestock or its product of contract farming producer as per contract.
- Contract Farming Facilitation Group (CFFG) for promoting contract farming and services at village / panchayat at level provided.
- Accessible and simple dispute settlement mechanism at the lowest level possible provided for quick disposal of disputes.
- It is a promotional and facilitative Act and not regulatory in its structure

8. Operation Green

To increase the production of tomato, onion and potatoes, Operation Green was launched. This scheme is launched on the lines of Operation Flood. This scheme will help in controlling the violent fluctuations in prices of tomato, onion and potatoes thereby helping the farmers in getting a stable income. This scheme also helps in making these vegetables available to the consumers at reasonable prices. Operation Green aims to promote farmer producers organisations, agri – logistics, processing facilities and professional management (Gulati and Juneja, 2018).

9. GrAMs

Gramin Agricultural Markets (GrAMs) are village level markets. Government of India aims to develop and upgrade existing 22,000 rural haats into Gramin Agricultural Markets (GrAMs). GrAMswhich will be electronically linked to e – NAM and exempted from the regulations of APMCs which will help the marginal and small farmers who are unable to sell their produce in APMCs and other wholesale markets by providing them provisions for direct sale to consumers and bulk purchasers (Bansal, 2018).

10. Farmer Producer Organizations (FPO's)

Farmer Producer Organizations (FPO's) are jointly formed by producers to address the challenges faced by them in agriculture like access to inputs and markets, credit availability, technology etc. FPO's help the farmers in getting inputs, credit, technology *etc* at a very low cost along with getting access to the markets easily. Department of Agriculture and Cooperation under Ministry of Agriculture, Govt. of India has identified 'Farmer Producer Organizations 'registered under the special provisions of the Companies Act, 1956 as the most appropriate institutional form around which the mobilization of farmers is to be made for building their capacity to collectively leverage their production and marketing strength. The ownership of the FPO is with its members. It is an organization of the producers, by the producers and for the producers. The essential features of FPO's are: a. It is formed by a group of producers for either farm or non-farm activities; b. It is a registered body and a legal entity; c. Producers are shareholders in the organization; d. It deals with business activities related to the primary produce/product; e. It works for the benefit of the member producers; f. A part of the profit is shared amongst the producers: and g. Rest of the surplus is added to its owned funds for business expansion, according to NABARD (The Hans India, 2018).

11. Enhanced coverage of Future Markets

In India, there is a high imbalance in price received by the farmers in different places for the same commodity. At some places, the same commodity fetches a very high price while at some other places farmers are compelled to go for distress sales in the same commodity. This is due to the middlemen taking advantage of the farmer's condition. For avoiding this problem, derivatives market is a very good option. Therefore, Government is focussing on enhanced coverage of future markets to different commodities in India (Soumya *et. al*., 2018).

Future trading in India also faces some challenges. In India there continues to be several misconceptions on the role of the derivatives market. Many important commodities are currently not being traded on futures. Barring a few commodities, the Indian futures market lacks liquidity. This makes the market vulnerable to manipulation on account of extremely low participation. Moreover, the prices of several commodities that are actively traded on futures platforms (such as soyabean, cotton, wheat) are driven more by international supply and demand considerations. A vibrant liquid futures market would provide the reference point for operating in the spot market and lead to genuine price discovery. This could be a boon to the farming community, which can then take sowing decisions based on the futures prices (Kaul, 2017).

Conclusions

Agricultural marketing in India faces large number of problems. Large number of middlemen present in the agricultural markets poses a serious problem to the farmers. These middlemen exploit the farmers who don't have market information with them and earns a huge profit leaving a low farmer's share in the consumer's rupee. The malpractices existing in the markets increase the cost of marketing which ultimately reduces the price received by the farmer and increases the price which the consumers have to pay for the produce. The common agricultural platform equipped with modern technologies will play an important role in ensuring better prices to the producers along with providing quality products to the consumers at reasonable prices. Therefore, Government should focus towards development and upgradation of scientific warehouses, cold storage, refrigerated vans for perishables *etc*. Government should emphasise on market intelligence and should give awareness and training to the different stakeholders involved in agricultural marketing. This will ensure the higher margin to all the stakeholders involved in agricultural marketing in a developing country like us.

References

Acharya, S. S. and Agarwal, N. L., 2011. Agricultural Marketing in India. Oxford and IBH Publishing Company Pvt. Ltd. New Delhi, India.

Agricultural and Processed Food Products Export Development Authority - APEDA, Department of Commerce and Industry, Union Budget, 2021-22.

Agriculture Marketing An Overview and Way Forward, 2017. A Knowledge Paper on Agriculture Marketing, FICCI, New Delhi, India.

Bansal, Suchi., 2018. Union Budget 2018 to boost rural demand. Livemint.

Bisen, J. and Kumar, R., 2018. **Agricultural marketing reforms and e-national agricultural market (e-NAM) in India: a review.** Agricultural Economics Research Review. 31 (Conference Number), 167-176.

C, Elamathi., 2013. Agricultural Marketing in India. Paripex – Indian Journal of Research. 2 (8): 45 – 47.

C, Soumya, Thakar, K. P., Prajapati, M. R. and Patel, A. 2018. Agricultural Marketing in India: Major Reforms. International Journal of Extension Education. 25-34.

Chand, Ramesh., 2016. e- Platform for National Agricultural Market. Economic & Political Weekly. 51 (28): 15-18.

Chengappa, P.G., Arun, M., Yadava C.G. and Prasanna Kumar, H.M., 2012. IT application in agricultural marketing service delivery - electronic tender system in regulated markets. Agricultural Economics Research Review, 25 (conference number), 359-372.

Gulati, Ashok. and Juneja, Ritika., 2018. From Plate to Plough: A vision coloured green. The Indian Express.

Kalamkar, S. S., 2017. Performance and Prospects of ENAM in Gujarat. Indian Journal of Agricultural Marketing. Conference Special. 31 (3): 61-71.

Kaul, Sanjay., 2017. Spot, future markets still not in lock step. The Hindu BusinessLine.

Report of the Committee for Doubling Farmers' Income, 2017. Volume III. Post - production Agri- logistics: maximising gains for farmers.

Roy, D., Joshi, P.K. and Chandra R., 2017. Elements of a national agricultural market in India. In: Financing agriculture value chains in India (Mani G., Joshi P., Ashok M. eds.). Springer, Singapore.

Sinha, R.K. and Kumar R., 2010. Innovative technologies, institutions and policies for successful value chains for tur farmers: a case study of NCDEX spot. Agricultural Economics Research Review, 21: 427-436.

The Hans India, 2018. Farmer producer organisations.

Yadav, Hema., Shalendra., and Haque, Enamul., 2017. Linking Farmers to Electronic Markets (E – NAM): Current Scenario and A Way Forward. Status Paper Submitted to COSAMB. National Conference on E-NAM: Challenges & Opportunities. CCS National Institute of Agricultural Marketing, Jaipur, India.

LP 1.4

Empowering farmers: The role of Farmer Producer Organizations

Maulika Patel[1], Keyur Gardhariya[2] and Aneri Tankiwala[3]

[1]Agriculture officer, Directorate of Agriculture, Sector-10/A, G.S., Gandhinagar

[2]Research Associate, EEI, Anand

[3]Ph.D. Scholar, Dept. of Agri. Extension & Communication, NAU, Navsari

Email: maulipatel8140117127@gmail.com

Introduction

In the realm of Indian agriculture, the pursuit of sustainable growth and prosperity has been an enduring challenge, and it is in this context that innovative extension approaches, agricultural marketing reforms, and policies have emerged as pivotal catalysts for transformation. As a nation deeply rooted in its agrarian traditions, India has been continuously evolving its strategies to enhance agricultural productivity, ensure food security, and uplift the livelihoods of millions of farmers. In recent years, a dynamic shift has taken place, characterized by a growing recognition of the need for comprehensive reforms in extension services, marketing practices, and policy frameworks. This transformation has sparked a renewed enthusiasm and determination to revolutionize Indian agriculture, making it not only self-sufficient but also globally competitive. In this introductory exploration, we delve into the intricate tapestry of innovative extension approaches, agricultural marketing reforms, and policies that are reshaping the landscape of Indian agriculture, offering insights into their significance, challenges, and potential impact on the nation's agrarian future.

The role of Farmers' Producer Organizations (FPOs), Farmer Organizations (FOs), and cooperatives in the empowerment of farmers is a compelling narrative of collective strength and community-driven progress within the agricultural sector. These entities have emerged as vital catalysts for positive change in rural farming communities around the world. By fostering unity among individual farmers, providing access to resources and knowledge, and advocating for their interests, FPOs, FOs, and cooperatives are reshaping the landscape of agriculture. In this exploration, we will delve into the multifaceted roles these organizations play in empowering farmers, elevating their socio-economic status, and contributing to the sustainability of agricultural practices.

Farmer Producer Organizations (FPOs)

A Producer Organization (PO) is a legal entity formed by primary producers, *viz*. farmers, milk producers, fishermen, weavers, rural artisans, craftsmen. A PO can be a producer company, a cooperative society or any other legal form which provides for sharing of profits/benefits among the members. PO is a generic name for an organization of producers of any produce, e.g., agricultural, non-farm products, artisan products etc.

Farmer Producer Organizations (FPOs) are collective entities formed by a group of farmers, usually from the same locality or region, with the primary goal of improving the economic well-being of their members. FPOs are essentially farmer-owned and farmer-managed organizations that enable small and marginal farmers to pool their resources, knowledge, and collective strength to address common challenges and capitalize on opportunities in agriculture. These organizations are typically registered under relevant laws and function as legal entities, allowing them to engage in various agricultural and agribusiness activities.

FPOs serve as a platform for smallholder farmers to enhance their bargaining power in the market, access better agricultural inputs and technology, improve agricultural practices, and gain access to credit and financial services. By aggregating their produce, FPOs can negotiate better prices with buyers and processors, reduce post-harvest losses, and create value-added products. They also facilitate knowledge sharing and capacity building among members, helping them adopt sustainable and innovative farming practices.

Historical context and development of FPOs in India

The concept of Farmer Producer Organizations (FPOs) in India has its roots in the cooperative

movement initiated during the pre-independence period. After gaining independence in 1947, India's policymakers recognized the need to address the challenges faced by small and marginal farmers, who constitute a significant portion of the country's agricultural population. The government introduced various agricultural reforms and policies to promote cooperative farming and community-based agricultural initiatives.

The modern FPO movement gained momentum in the early 2000s as a response to the challenges faced by smallholder farmers in accessing markets, credit, technology, and agricultural inputs. The following are key developments and initiatives related to FPOs in India:

a. **National Policy on Farmers 2007:** The Indian government's National Policy on Farmers in 2007 emphasized the need for the formation of FPOs to empower farmers and promote their collective strength in agriculture.

b. **Promotion by NABARD:** The National Bank for Agriculture and Rural Development (NABARD) played a crucial role in promoting and financing FPOs across India. NABARD provided financial assistance and capacity-building support to encourage the formation and sustainability of FPOs.

c. **Promotion by SFAC:** Small Farmers' Agribusiness Consortium (SFAC) designated an agency for the Department of Agriculture and Cooperation (DAC) to act as a single window for technical support, training needs, research and knowledge management and linkages for investments, technology and markets. It creates sustainable linkages among FPOs and inputs suppliers, technology providers, extension-research agencies, marketing and processing players from the public and private sectors (Annon.,2015).

d. **Various Schemes and Programs:** Several government schemes and programs, such as the Rashtriya Krishi Vikas Yojana (RKVY) and the National Mission for Sustainable Agriculture (NMSA), have included provisions for supporting FPOs. These programs aim to boost agricultural productivity, increase income, and promote sustainable farming practices through FPOs. The Indian government has launched a new Central Sector Scheme (CSS) titled "Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)" with a clear strategy and committed resources to establish 10,000 new FPOs nationwide with a budget of Rs 68,660 million in 2019–20. For the first five years, a sum of Rs 44,960 million has been allocated and remaining amount for the subsequent four years.

e. **Amendments to Cooperative Acts:** Several states in India amended their cooperative laws to facilitate the registration and functioning of FPOs as legal entities, enabling them to conduct business, access credit, and avail government benefits.

Importance of Empowering Farmers

Indian farmers confront a complex web of challenges that impact their livelihoods and agricultural sustainability. These challenges include small landholdings, low productivity due to outdated techniques and limited access to modern technology, vulnerability to climate change-induced disruptions, overwhelming debt burdens, inadequate market access, and price fluctuations. Additionally, issues like lack of diversification, restricted credit availability, land degradation, water scarcity, and inconsistent government policies compound their difficulties. Farmer suicides remain a tragic consequence of this plight. So, Empowering farmers, especially in the Indian context where agriculture is a predominant source of livelihood, holds immense significance for several reasons:

1. **Economic Backbone:** Agriculture is the backbone of the Indian economy, providing employment to nearly half of the country's workforce. It contributes significantly to the GDP and serves as a crucial source of income for millions of families. Empowering farmers can lead to increased productivity, higher incomes, and improved living standards for these households, which is essential for poverty alleviation and economic growth.
2. **Food Security:** India's vast population relies heavily on agricultural produce for food. Empowering farmers ensures a steady and reliable food supply, reducing the risk of food scarcity and price fluctuations. In a country with over a billion people, food security is of paramount importance.
3. **Rural Development:** Empowering farmers can stimulate rural development by increasing income in

rural areas. This can lead to improved infrastructure, better access to education and healthcare, and an overall enhanced quality of life in rural communities.

4. **Sustainable Agriculture:** Promoting sustainable farming practices among Indian farmers is crucial to protect the environment and natural resources. Empowering farmers with knowledge and resources to adopt eco-friendly practices can contribute to long-term agricultural sustainability, ensuring that future generations can also rely on farming.
5. **Market Access:** Many Indian farmers struggle with limited access to markets and face challenges in selling their produce at fair prices. Empowering them with market knowledge, infrastructure, and access to digital platforms can help bridge this gap and enable them to fetch better prices for their crops.

Formation of FPOs

In India the FPO are formed through three acts. Firstly, it can be formed and registered as a Cooperative Societies under the Acts as Cooperative Societies' Act of Individual State, Autonomous Cooperative Societies' Act and Multi-State Cooperative Societies Act. Secondly, it can also be formed and registered as a Producer Company under the Acts as Registered under amended Companies Act, 1956, The terms of section 465 of the Companies Act, 2013, The provisions of the Part IX A of the Companies Act, 1956 shall be applicable mutatis mutandis to a producer company and the objects of a producer company shall confirm to the activities included in 581B of the Companies Act, 1956, and lastly, it can also be formed and registered as per Societies Registration Act, 1860, a society can be formed by minimum seven persons eligible to enter into contract. Individuals, partnership firms, companies and registered societies are eligible to form a society.

01 Pre-Formation Stage

- Identification of uniform cluster
- Organization of Farmer Interest Groups (FIG)
- Collection of share money

02 Formation Stage

- Membership drive and formalizing the management structure,
- FPO Incorporation- documentation and registration
- Capacity building of FPOs functionaries

03 Implementation of Business Plans

- Actual operation of production, value addition, marketing, etc.
- Regulatory approval for the activities (if needed), eg: selling of fertilisers or agro-chemicals

Schemes of Govt. of India/ SFAC for FPOs

Equity Grant Fund Scheme: SFAC offering a supporting equity grant of up to Rs.10 lakh to double the share capital of farmer producer companies

Credit Guarantee Fund Scheme: Provide a Credit Guarantee Cover to Eligible Lending Institutions to enable them to provide collateral free credit to FPCs by minimizing their lending risks in respect of loans not exceeding Rs. 100.00 lakhs.

Scheme for Creation of Backward and Forward Linkages: Provide effective and seamless backward and forward integration for processed food industry by plugging the gaps in supply chain in terms of availability of raw material and linkages with the market.

National Rural Livelihood Mission (NLRM): Enable small and marginal farmers to gain better price realization, access to markets, improved technologies for value addition and technical support.

Function and activities of FPOs

FPO are mainly formed for services and activities for their development as may be necessary as; a) Supply quality production inputs like seed, fertilizer, pesticides and such other inputs at reasonably lower wholesale rates, b) Make available need-based production and post-production machinery and equipment like cultivator, tiller, sprinkler set, combine harvester and such other machinery and equipment on custom hiring basis for members to reduce the per unit production cost, c) Make available value addition like cleaning, assaying, sorting, grading, packing and also farm level processing facilities at user charge basis on

reasonably cheaper rate. Storage and transportation facilities may also be made available, d) Undertake higher income generating activities like seed production, bee keeping, mushroom cultivation *etc.,* e) Undertake aggregation of smaller lots of farmer-members' produce; add value to make them more marketable, f) Facilitate market information about the produce for judicious decision in production and marketing, g) Facilitate logistics services such as storage, transportation, loading/un-loading etc. on shared cost basis, and h) Market the aggregated produce with better negotiation strength to the buyers and in the marketing, channels offering better and remunerative prices.

Impact of FPOs on farmers

Impact can be defined as a change in an outcome that can be attributed to a specific intervention. This change can be positive or negative, and it can be measured through various indicators. The idea behind measuring impact is to understand the effectiveness of a FPOs in achieving its intended goals and to identify areas where improvements are needed. It can be measured through studying major aspects like change in crop production, change in annual income, change in cost of farm inputs, change in modern technology based farm machinery and implements, change in household items, change in saving and investment, change in living standard and change in social status.

A. Economic empowerment of farmers:

1. **Access to Better Markets:** Farmer Producer Organizations (FPOs) play a crucial role in improving the economic well-being of farmers by facilitating their access to better markets. Here's how:
   a. **Collective Bargaining Power:** FPOs bring together small and marginal farmers, enabling them to collectively negotiate with buyers, processors, and retailers. This collective bargaining power allows farmers to secure better prices for their produce.
   b. **Market Linkages:** FPOs establish direct links between farmers and markets, reducing the need for intermediaries. By eliminating middlemen, farmers can receive a higher share of the final sale price.
   c. **Market Information:** FPOs provide farmers with valuable market information, including demand trends and price fluctuations. This information allows farmers to make informed decisions about when and where to sell their produce for the best possible prices.
2. **Reducing Post-Harvest Losses:** Post-harvest losses are a significant economic burden for farmers. FPOs can help in the following ways:
   a. **Infrastructure Development:** FPOs often invest in post-harvest infrastructure such as cold storage facilities, warehouses, and processing units. These facilities help reduce losses due to spoilage and improve the quality of the produce, commanding higher prices in the market.
   b. **Technical Support:** FPOs provide training and technical support to farmers on best practices for harvesting, handling, and storing crops. This reduces the likelihood of post-harvest losses.
3. **Negotiating Fair Prices:** FPOs are instrumental in ensuring that farmers receive fair prices for their produce:
   a. **Price Transparency:** FPOs work to create transparency in pricing mechanisms. They often engage in price discovery processes that ensure farmers are paid a fair market price, rather than being exploited by buyers.
   b. **Quality Standards:** FPOs help farmers adhere to quality standards and certifications demanded by the market. This compliance enables farmers to access premium markets and higher prices.

B. Social empowerment of farmers:

Farmer Producer Organizations (FPOs) play a crucial role in promoting social empowerment, with a particular focus on advancing gender equality and women's participation in decision-making within the agricultural sector. Here are some key points highlighting the social empowerment aspects of FPOs:

Women's Participation in Leadership Roles: FPOs actively encourage and facilitate the involvement of women in leadership positions. By doing so, they empower women to take on influential roles in the organization, which translates into increased participation in decision-making processes related to farming practices, resource allocation, and marketing strategies.

Financial Inclusion: FPOs often provide financial services and resources to their members, including women farmers. Access to credit, savings, and insurance schemes enables women to invest in their farms, diversify agricultural activities, and participate more actively in economic activities, ultimately contributing to their economic empowerment.

Training and Capacity Building: FPOs organize training and capacity-building programs that specifically target women farmers. These programs aim to enhance their agricultural skills, knowledge about sustainable farming practices, and understanding of market dynamics. Equipped with these skills, women can make informed decisions about crop selection, pest management, and resource management.

Market Access: FPOs create market linkages for their members, including women. By collectively marketing their produce, women farmers can access better prices for their products and negotiate with buyers from a position of strength. This not only enhances their economic well-being but also boosts their self-confidence and decision-making abilities.

Community Engagement: FPOs often serve as platforms for women to engage with their local communities. Through these organizations, women can voice their concerns, share experiences, and collaborate with other members to address common challenges. This sense of belonging and community participation fosters social empowerment among women farmers.

Empowerment beyond Agriculture: FPOs recognize that empowerment goes beyond agriculture. They often offer training in areas such as financial literacy, leadership development, and legal rights. This broader empowerment equips women with the skills and knowledge they need to make decisions not only in farming but also in other aspects of their lives.

Policy Advocacy: FPOs can play a role in advocating for policies and initiatives that benefit women in agriculture. They can engage with local and national authorities to ensure that the needs and concerns of women farmers are adequately addressed in agricultural policies and programs.

So, Farmer Producer Organizations (FPOs) are instrumental in promoting social empowerment, particularly with regard to gender equality and women's participation in decision-making. Through leadership opportunities, financial inclusion, training, market access, community engagement, and policy advocacy, FPOs empower women to become active agents of change in the agricultural sector and society as a whole.

Conclusion

Farmer Producer Organizations (FPOs) play a pivotal role in empowering farmers by enhancing their collective bargaining power, providing access to resources, facilitating market linkages, and promoting knowledge sharing and capacity building. These organizations empower farmers to improve their livelihoods, reduce vulnerability, and contribute to sustainable agricultural development.

References

Anonymous (2002), Merriam-Webster's Collegiate Dictionary (11th Edition). Springfield.

Anonymous (2014), GOI (Government of India) and SFAC (Small Farmers' Agribusiness Consortium). "Year of Farmer Producer Organizations." Ministry of Agriculture, Department of Agriculture & Cooperation, New Delhi. http://agritech.tnau.ac.in/farm association/pdf/Year-of-FPO2014.pdf.

Anonymous (2015), Farmer producer organisations- frequently asked questions (FAQs). Farm sector policy department and farm sector development department, NABARD.

Anonymous (2016), Agriculture census, 2015: All India report on number and area of operational landholding, http://agcensus.nic.in/document/agcen1516/T1ac201516.pdf.

Anonymous (2020), Operational guidelines: Formation and promotion of 10,000 Farmer Producer Organizations (FPOs), Government of India Department of Agriculture, Co-operation & Farmers' Welfare Ministry of Agriculture & Farmers' Welfare.

Anonymous (2021), Annual report of ICAR.

Patel, M. J. (2023). Image and impact of farmer producer organizations on agriculture of south Gujarat. *Ph. D thesis*; N.A.U., Navsari, Gujarat.

LP 1.5

Paradigm shifting in agricultural marketing and policies in India

Jadeja, R. M.[1], Soumya C[2] and Thakar, K. P[3]

[1] Assistant Research Scientist, Regional Research Station, Bhachau (Kutch)

[2]and [3]Department of Agricultural Economics

C.P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar

Email: rmjadeja@sdau.edu.in

Introduction

Agriculture and allied sector activities are critical to the Indian economy, with nearly 54.6 per cent of the country's workforce dependent on this sector for sustenance (DA&FW, 2021). India, with its agrarian economy deeply rooted in tradition, has embarked on a transformative journey in recent years through a series of agricultural market reforms. These reforms, driven by the imperative to enhance efficiency, competitiveness, and sustainability in the agricultural sector, mark a pivotal moment in the country's agricultural policy landscape. The significance of these reforms lies not only in their potential to uplift the fortunes of millions of farmers but also in their broader implications for food security, economic growth, and rural development. Indian agriculture has become increasingly market oriented and commercialized. In the early 1950s, about 30-35 per cent of food grains output was marketed, which has increased to more than 70 per cent in recent years (Sharma & Wardhan, 2015). At the same time, there are huge post-harvest losses, 10-25 per cent for perishables like milk, meat, fish and eggs. The estimated losses in fruits and vegetables are even higher, 30-40 per cent. Storage is the major cause of post-harvest losses for all kinds of food in India, which is estimated at around 15 per cent by the Food Corporation of India. These adversely affect the Indian economy (Hegazy 2013). Another estimate by CIPHET indicates an annual loss of Rs. 92,651 crores (Jha et al. 2015). Use of scientific storage methods, privatization and development of larger and better distributed storage infrastructure down to the village level will help improve the storage capacities. This will reduce wastage, keep farm produce less volatile to market fluctuations and also help India boost its foodgrain exports.

Need of agricultural marketing reforms

The existing market infrastructure is inadequate to handle the increasing marketable surplus. Almost half of this surplus is sold outside Agricultural Produce Marketing Committee (APMC) markets. The traditional market system involves bulk selling and buying through a large number of intermediaries and transactions. This system has some serious disadvantages. therefore, alternative options and systems of marketing need to be developed. Agri-produce with specific attributes and traits (like high zinc or iron content or National Institution for Transforming India 26 high protein levels), which cannot be ascertained by the naked eye, require special market chains with traceability and labelling. This is not possible through bulk buying, selling and pooling. Many producers/ groups directly market such produce to consumers to meet the latter's preferences and earn much higher price compared to prices in APMC mandis. App-based sale of farm produce by farmers or farmers groups, e-commerce and digital commerce are also opening up new avenues for marketing. This requires a new ecosystem of agriculture marketing where the APMC system and alternative markets compete with each other and offer farmers choices to earn the best price for their produce. (Source: NITI Aayog,2023)

Table: 1 Need of market reforms

Fragmented Markets	Each market functioned as a separate entity, hampering intra and interstate trade
Insufficient Markets	At the same time, there were not enough markets to deal with growing produce
Market Fees & Charges	Taxes, various commissions raised the cost of the final product, while reducing the returns to farmers

Inadequate Infrastructure	Despite market taxes, infrastructure in markets remained underdeveloped and not in tune with modern supply chains
Post Harvest Losses	This inadequate infrastructure led to high post-harvest losses, estimated at Rs. 90,000+ crores in 2014
Restriction in Licensing	Entry as a licensed agent was restricted, discouraging competition and encouraging cartelization
High Intermediation Costs	The fragmented system led to high intermediation costs, raising costs for consumers, while depressing prices received by farmers
Information Asymmetry	Farmers often lacked market information, which traders & commission agents withheld from farmers
Inadequate Credit Facilities	Informal credit channels still dominated formal credit channels

Agricultural marketing institutions in India

India's agricultural landscape is characterized by a diverse array of institutions and organizations that play pivotal roles in the functioning of its agricultural markets. These institutions are instrumental in shaping policies, ensuring fair trade practices, and fostering the overall growth of the agricultural sector. Here is a comprehensive overview of key agricultural market institutions in the country:

1. **Food Corporation of India (FCI):** Serving as a cornerstone, FCI plays a crucial role in food procurement, storage, and distribution, ensuring food security across the nation.
2. **Cotton Corporation of India (CCI):** CCI focuses on the procurement and marketing of cotton, contributing significantly to the textile industry.
3. **Jute Corporation of India (JCI):** JCI is instrumental in the marketing and promotion of jute and allied products, supporting the jute industry.
4. **Directorate of Marketing and Inspection (DMI):** DMI plays a regulatory role, overseeing and standardizing marketing practices to ensure fair trade.
5. **Agricultural Produce Market Committees (APMCs):** APMCs are pivotal in the regulation of agricultural markets at the local level, facilitating fair transactions between farmers and buyers.
6. **State Agricultural Marketing Boards (SAMBs):** SAMBs operate at the state level, coordinating and implementing marketing policies to enhance agricultural trade.
7. **Commodity Boards:** These include Tea, Coffee, Cardamom, Rubber, Tobacco, Spices, Areca nut, and Dairy Products boards, each dedicated to promoting and regulating specific commodities.
8. **National Cooperative Development Corporation (NCDC):** NCDC supports and promotes cooperative initiatives in agriculture, fostering collaboration among farmers.
9. **National Agricultural Cooperative Marketing Federation (NAFED):** NAFED is a cooperative organization working towards ensuring fair prices for agricultural produce and providing marketing support.
10. **Tribal Cooperative Marketing Federation:** This organization focuses on the marketing and development of agricultural products from tribal regions.
11. **Agricultural and Processed Products Export Development Authority (APEDA):** APEDA plays a crucial role in boosting agricultural exports by promoting and regulating the export of various agricultural and processed products.
12. **National Agriculture Market (e-NAM):** e-NAM is a digital platform that facilitates online trading of agricultural commodities, promoting transparency and efficiency.
13. **Warehousing Development and Regulatory Authority (WDRA):** WDRA ensures the proper functioning of warehouses, promoting a secure and efficient warehousing system.

14. **State Warehousing Corporations (SWCs):** SWCs operate at the state level, providing warehousing facilities to support the storage and distribution of agricultural commodities.
15. **National Institute of Agricultural Marketing (NIAM):** NIAM contributes to agricultural education and research, promoting knowledge and skills in agricultural marketing.
16. **Small Farmers' Agribusiness Consortium (SFAC):** SFAC supports small farmers in agribusiness activities, fostering entrepreneurship and sustainable agricultural practices.
17. **Commission for Agricultural Costs and Prices (CACP):** CACP recommends minimum support prices (MSPs) for agricultural commodities, ensuring fair returns to farmers.
18. **National Bank for Agriculture and Rural Development (NABARD):** NABARD provides financial and developmental support to the agriculture sector, promoting rural development.
19. **National Commodity and Derivatives Exchange (NCDEX):** NCDEX facilitates online trading of agricultural commodities through commodity futures, contributing to price discovery and risk management.
20. **National Dairy Development Board (NDDB):** NDDB focuses on the development of the dairy sector, promoting sustainable and efficient dairy production.

India's agri marketing regulatory landscape

In the dynamic landscape of India's agricultural sector, Regulatory Measures and Legislative Revisions play a pivotal role in shaping the framework of agricultural marketing. These measures are instrumental in addressing challenges, fostering growth, and ensuring fair practices in the agri-business ecosystem. This concise overview delves into the key regulatory interventions and legislative amendments that have significantly impacted agricultural marketing in India. For a comprehensive understanding, refer to Table 2, which provides an organized list detailing the diverse array of regulatory measures and legislative revisions influencing the country's agricultural marketing paradigm.

Table 2 : Regulatory measures and legislative revisions for agricultural marketing in India

Year	Policy Reforms / act
1886	Karanjia Cotton Market (1st Regulated Market)
1897	Berar Cotton and Grain Market act
1937	Agricultural Produce (Grading and Marking) Act
1954,1964,	Prevention of Food Adulteration (PFA) Act
1955	Essential Commodity act
1956	Agricultural Produce (development and warehousing) Corporation Act
1963	Export (Quality Control & Inspection) Act
1973	Meat Food products Order
1958	Standard of Weights and Measure Act
1977	Vegetable Oil Products (Control) Order
1980	Prevention of Black marketing and Maintenance of Supply of Essential Commodities Act
1964,1980	The Cold Storage Order
1986	Consumer Protection Act
1986	Bureau of Indian Standards Act
1955, 1997	Fruit Products order (FPO)
2003	Model Agriculture Produce marketing (Development & Regulation) Act
2006	Food Safety and Standard Act
2013	National Food Security act
2015	New Foreign Trade Policy 2015-2020
2016	e-NAM
2017	Model Agricultural produce & Livestock marketing (promotion & Facilitation) Act

2018	Agricultural Produce and Livestock Contract Farming (Promotion & Facilitation) Act
2018	Agricultural Export Policy 2018
2020	The Farmers Produce trade and Commerce (Promotion & Facilitation) Ordinance
	The farmers (Empowerment and Protection) Agreement on Price Assurance and Farm services Ordinance
	The Essential Commodities (Amendment) Ordinance

Agricultural marketing empowerment through government schemes

Agricultural sector receives significant support through a spectrum of Government Schemes specifically designed to assist farmers in navigating the intricacies of agricultural marketing. This concise overview delves into a range of initiatives aimed at empowering farmers, improving market access, and ensuring equitable remuneration. Government interventions are instrumental in fostering the resilience of the agricultural ecosystem. For an intricate analysis of these supportive initiatives, it is recommended to refer to Table 3. This table presents a systematically organized list detailing the various Government Schemes that actively contribute to the advancement of agricultural marketing across India.

These schemes collectively contribute to the holistic development of the agricultural sector in India, with a focus on improving marketing infrastructure, ensuring fair prices, and enhancing the overall well-being of farmers.

Table 3: List of schemes that supporting farmers in agricultural marketing across India

Sr No.	Scheme Name	Objective
1	e-NAM (Electronic -National Agriculture Market)	Create a unified national market for agricultural produce
2	PM-KISAN (Pradhan Mantri Kisan Samman Nidhi)	Provide direct income support to small and marginal farmers
3	PM-AASHA (Pradhan Mantri Annadata Aay Sanrakshan Abhiyan)	Ensure remunerative prices for farmers' produce
4	Market Assurance Scheme	Strengthen market infrastructure and reduce post-harvest losses
5	Agricultural Infrastructure Fund	Support the creation of post-harvest infrastructure
6	Warehouse Infrastructure Fund	Enhance warehousing infrastructure for agricultural produce
7	Mega Food Parks Scheme	Link farmers, processors, and retailers through food parks
8	Operation Greens	Stabilize prices for fruits and vegetables in the market
9	Paramparagat Krishi Vikas Yojana (PKVY)	Promote organic farming practices
10	National Agriculture Market (e-NAM) Mission	Integrate APMC mandis for a unified agricultural market
11	Rashtriya Krishi Vikas Yojana (RKVY)	Enhance agricultural production and income in states
12	Price Stabilization Fund (PSF)	Control price volatility in agricultural commodities
13	PM FME (Pradhan Mantri Formalization of Micro Food Processing Enterprises) Scheme	Enhance competitiveness of micro food processing enterprises
14	Agri Export Policy	Promote agricultural exports by addressing policy constraints
15	Cooperative Marketing Assistance	Support and promote cooperative marketing initiatives
16	Kisan Credit Card (KCC) Scheme	Provide farmers with credit facilities for agricultural expenses
17	Pradhan Mantri Krishi Sinchai Yojana (PMKSY)	Improve water use efficiency and enhance water availability for agriculture
18	National Mission for Sustainable Agriculture (NMSA)	Promote sustainable agricultural practices and climate - resilient farming

19	Pradhan Mantri Fasal Bima Yojana (PMFBY)	Provide crop insurance to farmers against crop failure and yield losses
20	Pradhan Mantri Matsya Sampada Yojana (PMMSY)	Enhance fish production and double farmers' income in fisheries sector

Revolutionizing agricultural marketing: A closer look at recent reforms and their impact

In recent years, the agricultural sector in India has undergone a transformative phase with the introduction of progressive reforms aimed at revitalizing agricultural marketing practices. Notable initiatives such as the Electronic National Agriculture Market (eNAM) and the Open Network for Digital Commerce (ONDC) have emerged as catalysts for change, promising to reshape the landscape of agricultural transactions and empower farmers in unprecedented ways.

Electronic National Agriculture Market (eNAM):

eNAM, launched in 2016, is a flagship initiative that seeks to create a unified national market for agricultural commodities. By leveraging digital technology, eNAM connects traditional agricultural markets (mandis) across states, enabling seamless online trading. Farmers gain access to a broader market, leading to competitive pricing and increased profitability. The platform promotes transparency, reduces middlemen intervention, and streamlines the selling process, thereby empowering farmers with greater control over their produce.

Table: 4 Quantity of commodity traded in eNAM platform from 2016-17 to 2019-20

Quantity: Metric Tons

Year	Food Grains	Oil seeds	Fruits	Vegetables	Spices	Miscellaneous
2016-17	4247151.72	326332.80	36008.73	274885.19	111472.16	5576.73
2017-18	6797886.89	787654.52	161714.88	713327.10	590019.81	674156.04
2018-19	4754556.4	958727.75	137674.81	944103.63	763995.30	711643.93
2019-20	6453645.99	991645.07	141366.57	981917.94	743672.09	1227013.01
CAGR (percent)	9.39	42.35	48.32	50.68	81.34	407.10

Source : Kumar and Pant (2020)

Kumar and Pant (2020) studied on the quantity of commodities traded under various heads through e-NAM platform from 2016-17 to 2019-20 and corresponding Compound Annual Growth Rate (CAGR) of the same (Table:4). They revealed that compound annual growth rate of traded quantity and value of food grain is 9.39 per cent, which indicates that compound growth rate of food grain trade in e-NAM platform is showing comparatively higher positive growth in terms of quality comparison since inception of e-NAM.

Farmers' Producer Organization (FPO):

A Farmers' Producer Organization (FPO) stands as a pivotal initiative in the agricultural landscape, representing a collective endeavor by farmers to fortify their influence in the market. Functioning as a collaborative entity, an FPO brings farmers together, emphasizing resource pooling, knowledge sharing, and joint participation in diverse facets of agricultural production and marketing. (Sangappa *et. al,* 2023)

Role of FPO in Agricultural Marketing

1. **Collective Empowerment:** FPOs unify farmers, enhancing their negotiating power with buyers and stakeholders.
2. **Resource Synergy:** Farmers pool resources for modern practices, technology, and marketing, boosting productivity.
3. **Enhanced Market Reach**: FPOs establish direct links between farmers and buyers, reducing reliance on intermediaries.
4. **Knowledge Exchange Hub:** FPOs facilitate knowledge sharing, continuously improving agricultural skills and practices.

5. **Effective Risk Management:** Collective action within FPOs helps farmers navigate risks like price fluctuations and weather uncertainties.

Open Network for Digital Commerce (ONDC):

Introduced with the aim of creating a digital ecosystem for agricultural trade, ONDC is another groundbreaking reform. By establishing a unified digital platform, ONDC facilitates efficient and transparent trade practices, ensuring fair prices for farmers and fostering a more inclusive marketplace. The initiative aims to integrate various stakeholders, including farmers, traders, and logistics providers, into a seamless digital network, thereby enhancing overall efficiency and reducing transaction costs. (Kadaba *et. al,* 2023)

CONCLUSION

India's recent agricultural market reforms, driven by imperatives for enhanced efficiency and sustainability, mark a transformative era for the sector. Challenges such as fragmented markets, insufficient market information, inadequate market infrastructure, suboptimal supply chain management, and post-harvest losses have catalyzed initiatives such as the Electronic National Agriculture Market (eNAM) and the Open Network for Digital Commerce (ONDC). These contemporary reforms, exemplified by eNAM and ONDC, signify a shift towards digital platforms, reducing dependence on intermediaries and enhancing overall market efficiency. Government schemes work in synergy with these reforms, contributing to a holistic approach to agricultural development. As India progresses along its agricultural reform trajectory, steadfast commitment, adaptive policy frameworks, and collaborative endeavors emerge as pivotal factors. The collective impact of these reforms embodies a paradigmatic shift in agriculture, promising both empowerment for farmers and sustainable economic growth.

REFERENCES

DA&FW (2021). Annual Report. Department of Agriculture and Farmers Welfare, Ministry of Agriculture, Government of India, New Delhi, India. Access at https://agricoop.gov.in/Documents/annual-report-2020-21.pdf.

Hegazy, R. (2013). Technical report on "Post-harvest situation and losses in India." Access at https://www.researchgate.net/publication/301770292_Post harvest_Situation_and_Losses_in_India

Jha, S.N.; Vishwakarma, R.K.; Ahmad, T.; Rai, A. and Dixit, A.K. (2015). Report on assessment of quantitative harvest and post-harvest losses for major crops and commodities in India. ICAR- All India Coordinated Research Project on Post-Harvest Technology, CIPHET, Ludhiana.

Kadaba, Mahesh K.M ., Aithal, P. S. and Sharma, K R S. (2023). Government Initiatives and Digital Innovation for Atma Nirbhar MSMEs/SMEs: To Achieve Sustainable and Inclusive Economic Growth. *International Journal of Management, Technology, and Social Sciences* 8(1), 68-82.

Kumar, S. and Pant, S. C. (2020). Benefits of e-NAM process to farmers – A study. CCS National Institute of Agricultural Marketing.

NITI Aayog. (2023) Working paper on "From Green Revolution to Amrit Kaal: Lessons and Way Forward for Indian Agriculture". Access at https://www.niti.gov.in/sites/default/files/2023-07/Aggricultrue_Amritkal.pdf.

Sangappa, Rafi, D., Laxmi, B., Charishma, E., and Babu, K.S.. (2023). Strengthening Millet Value Chain through Farmer Producer Organizations. *Indian Journal of Extension Education*, *59*(3), 26–31.

Sharma, V.P. and Wardhan, H. (2015). Assessment of marketed and marketable surplus of major foodgrains of India. Final Report, Centre for Management in Agriculture (CMA) Indian Institute of Management (IIM) Ahmedabad 380 015.

LP 1.6

Agricultural marketing reforms in Maharashtra in context with Model Act: Status and issues

Sachin S More[1*], S S Lohar[2], and D S Perke[3]
Department of Agricultural Economics
College of Agriculture, Parbhani
VNMKV, Parbhani, Maharashtra

Introduction

The group of consumers is always shifting in favour of high-quality, hygienic, healthy, and perishable goods including milk, fruits, vegetables, and animal protein. The current agricultural commodity marketing systems are mainly characterized by a fragmented supply chain with a high number of middlemen, a dearth of cold storage and warehouse space, high post-harvest losses and wastage, high transaction costs, a low producer share in price, inadequate infrastructure, etc., are unable to satisfy the increasing demands of consumers for quick, safe, and hygienic food.

The State Agricultural Produce Market Committee Acts (APMC) governs markets for agricultural products. Initially, the purpose of APMC was to prevent middlemen from taking advantage of farmers by forcing them to sell their produce at the farm gate for extremely low prices. The APMC method was designed to guarantee farmers received fair prices by requiring all farm produce to be delivered to regulated market yards and sold through auctions. However, these organizations frequently formed cartels of their own and set the prices. The APMC Act has, for the most part, restricted farmers' ability to sell their produce directly to consumers and established a government monopoly in regulated wholesale marketplaces. This has hindered the growth of a competitive marketing system in the nation. Farmers are not given any incentives by the acts to engage in direct marketing, plan retail stores, implement cutting-edge marketing strategies and technologies, etc. various tax regimes, a system of various licenses, hefty market fees, commission charges, octroi, entry tax, sale tax, weighing charges, labour costs (for handling, loading, and unloading), purchase tax, rural development cess, etc. are further issues with the current marketing system.

For the advantage of all parties involved, the market must be able to capitalize on the potential of rising domestic and international demand. To accomplish this goal, the market should be professionally run, and the government should establish a competitive alternative marketing structure that gives farmers a variety of options for selling their produce and a comprehensive solution to satisfy the needs of all relevant parties. Since it offers outlets and incentives for higher output, an effective agricultural marketing system promotes the growth of the agriculture industry. Governments everywhere have realized how important it is to liberalize the agricultural markets.

In light of this, on December 19, 2000, the Ministry of Agriculture, Government of India has established an expert committee and a task force on agricultural marketing with the goal of reviewing the various States' current APMC laws and suggesting changes. A number of recommendations about agricultural marketing systems were made by the expert committee and task form on agriculture marketing reforms when they submitted their reports in June 2001 and June 2002, respectively. These suggestions were thoroughly examined and, for the most part, approved during the national conference of State Ministers on Agricultural Marketing.

Later, the Ministry of Agriculture formed a committee chaired by K.M. Shahani to examine the viability of the suggestions made by the task force and expert committee on reforms to agriculture marketing. The group was also tasked with creating a model law pertaining to farm marketing. **'The State Agricultural Produce Marketing (Development and Regulation) Act, 2003'**, is the draft model legislation that the committee finally approved. Its goals were to modernize the agricultural market system, establish and encourage public-private partnerships for the management of agricultural markets, and create an efficient

marketing system by improving pricing transparency, facilitated e-trading and pledge financing, established a market standards bureau to promote standardization, grade and certify the quality of produce, encouraged the processing of agricultural products, made provisions for the imposition of a single point levy of market fees on the sale of notified agricultural commodities in any market area, created an efficient infrastructure for marketing, made the process of exporting agricultural commodities smooth, and created alternative marketing systems by establishing new agriculture markets, such as consumer markets, contract farming, and the direct sale of agricultural produce, created special commodity markets for high value crops like onions, fruits, vegetables, flowers, etc.

Many of the state governments, notably the State Government of Maharashtra, have modified their APMC Act to incorporate the Model Act's requirements. In order to incorporate the Model Acts into the State APMC Act, the Maharashtra government amended its original APMC Act, "The Maharashtra Agricultural Produce Marketing (Development and Regulation) Act, 1963," in 2005. This was accomplished on December 27, 2005, with the passage of The Maharashtra Agriculture Produce Marketing (Regulation) (Amendment) Act, 2005. The APMC law is now undergoing an updating process. The Maharashtra government recently made significant decisions by enacting Maharashtra Ordinance No. XV of 2016, dated July 5, 2016, which deregulated the selling of fruits and vegetables outside the APMC yards. Further, through introduction of Maharashtra Agricultural Produce Marketing (Development and Regulation) (Amendment) Bill, 2021 (L. A. Bill No. XXXVI of 2021), the government has decided to charge the commission from the buyer that is currently subtracted from the farmer's final cost. Section 31 of the said Act empowers the Market Committee to levy fees and commission on every purchaser of agricultural produce marketed in that market area. However, there is no provision to levy and collect user charges from any market functionary, such as trader, commission agent, etc. Therefore, sub-section (1A) is added in the said section, so that the Market Committee shall with the prior approval of the Director, levy and collect user charges from market functionary. The 306 primary and 621 secondary markets in the State operate differently as a result of these legislation. Annexure 1 lists the division of breakdown of the APMC operating in the state.

Status of APMC Law

Major Amendments in Maharashtra's old APMC Act, 1963 in context with Model act: Status

Direct marketing

Anybody wishing to buy agricultural produce directly from farmers in one or more market areas is granted a direct marketing license under the Maharashtra Agricultural Produce Marketing (Development and Regulation 1967 Rules 4 B). Mah. 48 of 2005, dated December 27, 2005, added subsection (1) of section 5D to the existing APMC statute, amending it. About **1482 business firms** have received licenses from the Maharashtra government to buy agricultural products directly from farmers. (https://www.msamb.com Up to December 31st, 2022). **On October 4, 2007, Aditya Birla Retail Limited, Mumbai**, was granted the first license for direct marketing. Direct marketing licenses were first mostly granted to corporations, such as Aditya Birla, Reliance, ITC Foods, etc., but the government is now also granting these licenses to FPCs. The purpose of this was to promote direct marketing within the State. The government's action will assist the FPCs in selling their produce (Nanda Kasabe, 2016). In order to encourage number of farmer produce companies, farmers groups, and other organizations to enter the direct marketing space, the Maharashtra government is now lenient when it comes to granting direct marketing licenses to FPC, farmers groups, self-help groups, and co-operative marketing societies in exchange for bank guarantees of Rs. 20 lakh and a licence fee of Rs. 50,000. (https://mahapanan.maharashtra.gov.in/1106/FAQ). Beside this, Under section 31 of the APMC act, market fee is exempted under direct marketing scheme. [Partha Sarathi Biswas, 2016 dated 2.08.2016]

Deregulation of fruits and vegetables:

The Maharashtra government introduced a Special Ordinance (Maharashtra Ordinance No. XV of 2016) on July 5, 2016, which said that the fruits and vegetables were removed from the list of commodities that the APMC had notified. With the passage of this clause, the sale of fruits and vegetables in the State is

now more liberalized, and anybody may do legal fruit and vegetable business outside of the market created by section 5 of the APMC Act of 1963. This amendment mandates that the market committee regulate the sale of fruits and vegetables just within the market yard. This amendment seeks to open up a marketing route to give farmers more autonomy.

Private Market

The Maharashtra Agricultural Produce Marketing (Development and Regulation 1967 Rules 4 C) stipulates that any individual wishing to establish a private market in one or more market areas must obtain a private marketing license. The purpose of a private market can be the processing, trading, exporting, grading, packing, and value addition of agricultural produce. The APMC Act was amended by adding sub section (1) of section 5D by Mah. 48 of 2005, dated 27.12.2005. As of 2018–19, the State operates 52 private markets. The Government of Maharashtra granted the first licence to NCDEX spot exchange Ltd. Mumbai to establish a private market in the State. About Rs. 8,360 crore of total business was conducted in the private markets in 2019–20, compared to Rs. 48,429 crores in the 306 primary APMC yards throughout the State. (https://m.timesofindia.com).

Farmer- Consumer markets

Anyone wishing to start a farmer-consumer market in one or more market areas can apply for a farmer-consumer market license. The license holder then consents to or starts building the necessary infrastructure to create a farmer-consumer market. Mah. 48 of 2005, enacted on December 27, 2005, amended the APMC Act by adding subsection (3) of section 5D. Through these changes, farmers now have the chance to sell their produce directly to customers. On August 14, 2016, the state legislative building's premises hosted the first farmer-to-consumer market, *Sant Shiromani Shri Savta Mali Athavda Bazar*, which was launched by the Honorable Chief Minister of Maharashtra, *Shri. Devendra Fadnavis*. On Sundays, this market will continue to be open. About 25 tonnes of vegetables grown by farmers in the Thane, Palghar, and Junner (Pune) districts were delivered to this market to be sold by 40 booth holders. According to the Honorable *Sadabhau Khot*, Minister of State for Marketing, the government will assist in the establishment of an additional 35 such markets in the Mumbai city. Market service fees in these markets are to be paid by the seller upon the sale of agricultural produce and are to be sent to the Farmer-Consumer Market's owner. When selling or buying agricultural produce in the farmer-consumer market, there cannot be any market fees.

Contract farming

The Maharashtra Agricultural Produce Marketing (Development and Regulation) 1967 Rules 4 O provides that the producer and the sponsor enter into a contract for contract farming. The amendment was done in APMC ACT by adding chapter 1 C (3) of section 5E, Mah. 25 of 2006, dated 19.07.2006. The following are some of the act's key clauses pertaining to contract farming- 1) No title, or rights in or, ownership or possession of agricultural land of the Contract Farming Producer shall be transferred, alienated or vested in the Contract Farming Sponsor or his successor or his agent. 2) Dispute relating to and arising out of a Contract Farming Agreement shall not be called in question in any Court of Law. 3) The agricultural produce covered under the Contract Farming Agreement may be sold to the Contract Farming Sponsor outside the market yard and in such a case; no market fee shall be leviable.

National Integrated Produce Market

It is possible to build a national integrated produce market (Terminal Market Complex) for fruits and vegetables in any location or places that the notification designates. The National Integrated Produce Market was covered in a distinct chapter 1 A section 5 A of the APMC Act, 1963 through The Amendment of Mah. 13 of 2003, dated 09.04.2003. A terminal market complex is where agricultural products are processed after being transported from collecting centers. Perishable items like as fruits, vegetables, flowers, herbs, meat, and poultry are stored here, as are non-perishable items like food grains and oil seeds. The Central Government has chosen to establish 21 contemporary terminal markets across multiple States under a public-private partnership model. In exchange, the State Government will get equity support up to 49 percent. The

Terminal Market is being built to reduce the post-harvest losses which are now upto 30 to 40 per cent for perishable goods like fruits and vegetables. Apart from this, Terminal Market will link farmers directly to the markets and provide more alternatives to sell their produce and reduce the number of intermediaries. The Government of Maharashtra has decided to set up three Terminal Market complexes (TMC) in the State. The location selected in the State were Mumbai (Thane), Nashik and Nagpur. The important characteristics of these terminal markets were as follows.

Sr. No.	Place of Terminal Market	Budget	Land requirement	Handling Capacity	Status
1	Mumbai	260 Crore	92 acres of land at Babgaon Village, Tq. Kalyan Dist. Thane	3000 metric tonnes per day.	Land was acquired and handed over to MSAMB for further development
2	Nashik	60 Crore	100 acres of land of Mouje Pimpri Sayyad Tq. and Dist. Nashik	1000 metric tonnes per day.	Decision was taken to transfer the land to MSAMB
3	Nagpur	55 Crore	Mauje Waranga Tq. and Dist. Nagpur	750 metric tonnes per day.	Land was identified.

The proportion of non-perishable commodities for trade in the Terminal Markets shall not exceed 15 per cent of the capacity of market. Similarly, the proportion of non-horticulture products within the perishable commodities shall not exceed 15 per cent of the capacity of market.

Special commodity market

After taking into account the turnover and unique infrastructure requirements for marketing a particular agricultural output, the State Government may, by notice in the Gazette, declare a special commodities market for any market in addition to the current one. Mah. 48 of 2005, dated December 27, 2005, added subsection (5) of section 5D to the existing APMC statute, amending it.

Single Licence

As per Maharashtra Agriculture Produce Marketing (Development and Regulation) Rules 6 (3A)) single trader license is given to any trader desiring to operate in more than one market area. This action of Government simplifies the licensing system in the State. Provisions were made for issue of a single licence to operate in the entire state or part of the state. The amendment was done in the old APMC act by adding sub section (3) of section 7 by Mah. 48 of 2005 dated 27.12.2005. The person applying for licence to operate in more than one market area shall be required to pay the licence fee at such rate as may be prescribed in sub-section (3) Mah.48 of 2005 section 8. At present, there were 25 firms (http://www.msamb.com/download/single_ license_list.pdf) are having the single licence to do the business in more than one APMC in the State during the year 2014-15. The Adani Wilmar Ltd. Village Malegaon Tq. Saoner Dist. Nagpur was the first firm who got the single licence to do the business in more than one APMC in Maharashtra (SL-05/08 dated 22/07/2008)

Single Point Levy

The sub-section (1) of section 31 of the APMC Act, 1963, states that no fees related to agricultural produce that have already been levied and collected by another Market Committee, private market, farmer-consumer market, special commodity market, or under direct marketing in the State may be levied and collected in any market area (Maharashtra Ordinance No. XV of 2016 dated 05th July, 2016). This was carried out to guarantee unhindered and easy trading of agricultural products. As intended by the Model Act of 2003, this modification introduces Single Point Levy of fees to the State of Maharashtra.

Extension cell

Provision was made to establish separate extension cell to provide market led extension service to the farmers. As on 31st December, 2022 there are 306 main markets and 621 subs –markets functioning in the state, but there were hardly any APMC in the State, where market led extension activities are carried out.

Other important amendments /administrative decision of Government of Maharashtra in contest to Model act.

1. Market Reforms desk was established within Department of Marketing, to issue Direct Market, Farmer-Consumer market, Private market and single trade licence under the provision of Maharashtra APMC Act, 1963.
2. Every markets committee shall reserve sufficient space in the market area of its principal and subsidiary markets for the agriculturists to enable them to sell their own agricultural produce directly to the consumers without the help of intermediaries and shall also look after the maintenance of such space (As per sub section (3) was added by Mah.11 of 2003 section 3.)
3. State Government may by notification in the official Gazette, declare any Agricultural Produce Market Committee to be divisional market committee for more than one districts or regional market committee for more than one talukas. [Sub section (1-B) of Mah 48 of 2005 Section 9 (1)]
4. The state Government may appoint any officer not below the rank of Assistant Registrar of Co-operative societies from the cooperative Department as the secretary of any market committee. (Maharashtra 10 of 2008 Section 5)
5. The provision is made to incurve expenses for prevention of distress sale of agricultural produce as well as to prevent purchase of agricultural produce in the market area below the minimum support price fixed by the Government or making purchase and sale of the agricultural produce during the strike of market functionaries. (Maharashtra 11 of 2003 section 14)
6. Computerization of auction process starting from arrivals till dispatch of agriculture process at APMC has initiated in the State.
7. Provision was made for enabling e-marketing of agricultural produce which will allow establishment of virtual markets. (Maharashtra Ordinance No. XV of 2016 dated 05th July, 2016)

Issues in Agriculture Marketing Reforms

The amendments in APMC act in regards to the Model act have not showed its significant presence on ground level in the State, even after a decade. There are some issues still to be needed to address at proper level these are…

Commission Charge

Commission agents in the market provide an essential service to both buyer and seller. The Model APMC act bars the commission agents from deducting the commission from the seller-farmer, but the incidence of these commission falls on the seller-farmers since buyers are discounting their bids to the extent of the commission charges by the commission agents.

Investment

The model APMC act provides provision for setting up of markets by private sector, only making provisions in the law is not adequate to create competition between the existing APMC markets and private markets. This is mainly because that, the Government is creating marketing infrastructure in existing APMC by investing public funds and providing loan at subsidised rate. The owner of the private markets has to invest at his own; the investment in setting up of new private market is too high considering the land requirement

and prices of land in present conditions. This slows down the process of setting up of new private markets in the State.

High market fee

Market fees by definition is the charge for the services provided to market functionaries, but now in many of the APMC it become a source of income. In Maharashtra it varies between 3 to 10 per cent depending upon the commodity.

Essential Commodity Act (EC Act)-1955

State government often issue control orders promulgated under EC act adversely affecting trading agriculture commodities such as foodgrains, edible oils, pulses and sugar. Due to restrictive provisions of EC act, 1955 (regulation of stock limits, restrictions on movement of goods, levy system etc) private investment in large scale storage gets hampered. Government should make difference between investor and black marketer.

Legal Discrimination

The government's decision of delisting fruits and vegetables from the scope of the APMC and changing the recovery of commission from buyers instead of farmers made unrest among the APMC traders, as per their opinion this decision has made legal discrimination by framing two sets of rules, one for APMC traders and another of those traders who operates outside the APMC.

Conclusion

Liberalisation in FDI in retail can create possibilities for massive investment in marketing infrastructure. This may boost the development of private markets and eventually create the competition among the market players. Creating the law is the first step to improve economic conditions of people dependent on agriculture but it has to be backed by government investment, creating infrastructure and giving appropriate policy support.

References

Anonymous (2010) The Maharashtra Agricultural Produce Marketing (Development and Regulation) Rules, 1967 Sixth Edition, Government of Maharashtra.

Anonymous (2013) The Maharashtra Agricultural Produce Marketing (Development and Regulation) Act, 1963 upto 10th May, 2013, Government of Maharashtra.

Anonymous (2015) A national markets for agricultural commodities: Some issue and the way forward. Economic Survey-Part-I 2014-15: 117-121.

Anonymous (2016) The Maharashtra Agricultural Produce Marketing (Development and Regulation) (Amendment) Ordinance, Government of Maharashtra.

Anonymous (2019) Agriculture Export policy (AEP) of Maharashtra State, Maharashtra State Agricultural Marketing Board, Pune.

Anonymous (2021) Maharashtra Agricultural Produce Marketing (Development and Regulation) (Amendment) Bill, 2021, Government of Maharashtra.

Anonymous (2023) Annual report-2022-23. Maharashtra State Agricultural Marketing Board, Pune.1-41.

https://m.timesofindia.com

https://mahapanan.maharashtra.gov.in/1106/FAQ

https://www.msamb.com

Nanda Kasabe (2016) Boost for framers in Maharashtra, gets direct access to markets. *The Indian Express* dated 13.08.2016.

ANNEXURE

Annexure 1: Division-wise break-up of the APMCs functioning in the State

(As on 31st March, 2023)

Sr. No.	Division	Main-Market	Sub-Market Yard
1	Ratnagiri	20	44
2	Nasik	53	120
3	Pune	23	67
4	Aurangabad	36	72
5	Latur	48	84
6	Amravati	55	99
7	Nagpur	50	81
8	Kolhapur	21	54
	Total	**306**	**621**

LP 1.7

Role of APMC and NGOs in Indian agricultural marketing in India

Kalpesh L. Chaudhary[1], Umang B. Patel[2], Parul M. Patel[3] and K. P. Thakar[4]

[1]Assistant Professor, Dept of Agril. Extension and Communication, NMCA, NAU, Navsari

[2]Ph.D Scholar, Dept of Agricultural Economics, NMCA, NAU, Navsari

[3]Ph. D. Scholar, Dept of Agricultural Economics, CPCA, SDAU, Sardarkrushinagr

[4]Professor and Head, Dept of Agricultural Economics, CPCA, SDAU, Sardarkrushinagr

E-mail:kalpeshjudal@gmail.com

Introduction

Agricultural marketing in India is vital for ensuring food security, providing employment and income opportunities, enabling value addition, supporting trade, and contributing to rural development and overall economic growth. An efficient and well-organized agricultural marketing system benefits farmers, consumers and the entire economy.

APMCs provide a formalized structure for agricultural trade, ensuring fair pricing and preventing market malpractices. On the other hand, NGOs bring innovation, knowledge, and support to farmers, enabling them to adapt to changing market dynamics and adopt sustainable practices. The combined efforts of APMCs and NGOs contribute to the growth of the agricultural sector, the empowerment of farmers and the creation of a more equitable and efficient agricultural marketing ecosystem.

Structure of APMC

Each state in India has its own APMC Act, which outlines the establishment, management, and functioning of APMCs within that state's jurisdiction. Under the Act, APMCs are set up in various regions or towns to cover specific geographical areas. APMC markets typically consist of market yards, where farmers bring their produce for sale, and auction platforms where buyers bid for the produce.

The structure of APMCs includes various key stakeholders:

- **Farmers:** Producers of agricultural commodities who bring their produce to the market for sale.
- **Commission Agents:** Intermediaries who facilitate the sale of agricultural produce on behalf of the farmers. They often handle grading, sorting and marketing.
- **Traders:** Individuals or businesses that buy agricultural commodities from farmers through auction or direct purchase.
- **Market Committees**: The governing bodies of APMCs responsible for regulating and managing market operations. These committees consist of government representatives, farmers, traders, and experts.
- **Market Superintendent**: An official appointed to oversee the day-to-day operations of the market and ensure compliance with market regulations.

Functions of APMC:

The primary functions of APMCs are aimed at benefiting both farmers and consumers, while maintaining a fair and transparent trading environment:

- **Price Discovery:** APMCs facilitate the process of price discovery through open and competitive auction mechanisms. This helps in determining fair prices for agricultural commodities.
- **Market Infrastructure:** APMCs provide necessary infrastructure such as storage facilities, cold storage, warehouses and auction platforms to ensure that the produce remains in good condition and can be traded efficiently.
- **Grading and Sorting:** APMCs often engage in grading and sorting of agricultural commodities, ensuring that only quality produce reaches the market, thereby maintaining consumer confidence.
- **Market Regulation**: APMCs regulate trading practices to prevent unfair practices and ensure that farmers receive reasonable prices for their produce.

- **Price Support:** Some APMCs also offer price support mechanisms, wherein they intervene to stabilize prices during times of price volatility, thereby safeguarding farmers' incomes.
- **Market Information:** APMCs provide market information to farmers about prevailing prices, demand trends and market conditions to helping them make informed decisions about when and where to sell their produce.
- **Dispute Resolution:** APMCs offer a platform for resolving disputes between farmers, traders, and other stakeholders. To contributing to smoother transactions.
- **Market Fee Collection:** APMCs collect fees and charges from traders and commission agents for utilizing market facilities and services.
- **Quality Control:** APMCs ensure that the quality of agricultural produce is maintained through proper grading and standardization, ensuring that consumers receive safe and quality products.

Role of APMCs in regulating agricultural trade and markets

The Agricultural Produce Market Committees (APMCs) play a crucial role in regulating agricultural trade and markets in many countries, particularly in India. APMCs are established by state governments to facilitate fair and transparent transactions between farmers and traders, ensuring a smooth flow of agricultural commodities from farms to consumers while protecting the interests of both parties.

The primary objective of APMCs is to create a structured platform for buying and selling agricultural produce. They serve as intermediaries that connect farmers with wholesale buyers, retailers and processors. This system helps in stabilizing prices, ensuring quality control and preventing market exploitation. APMCs provide physical marketplaces, commonly referred to as "mandis," where farmers can bring their produce for auction or direct sales. These marketplaces are equipped with necessary infrastructure such as storage facilities, grading and sorting units, and weighing scales.

One of the key functions of APMCs is to regulate the pricing of agricultural commodities. Through the auction process, transparent price discovery is facilitated, ensuring that farmers receive reasonable compensation for their efforts. The competitive bidding system prevents monopolistic practices and encourages fair competition among buyers, preventing the exploitation of farmers by middlemen. Additionally, APMCs help maintain quality standards by establishing guidelines for grading and certifying produce, which assures consumers of the products' quality and safety.

APMCs also provide essential market information to both farmers and traders. By collecting data on prices, supply, and demand, they enable stakeholders to make informed decisions. This information helps farmers decide when and where to sell their produce, and traders can adjust their purchasing strategies accordingly. The dissemination of market information enhances transparency and reduces information asymmetry, benefiting all participants in the agricultural value chain.

In recent times, the role of APMCs has been a subject of debate and reform. Critics argue that the monopoly of APMCs over agricultural trade can lead to inefficiencies and hinder farmers' income. To address these concerns, some governments have introduced agricultural marketing reforms to liberalize trade outside the APMC framework. These reforms aim to provide farmers with more options for selling their produce, including direct sales to private buyers, processors, and retailers.

However, proponents of APMCs highlight their significance in protecting farmers, especially smallholders, from price volatility and market uncertainties. The direct interface with traders through APMCs offers a level playing field for farmers, preventing them from being at the mercy of unscrupulous middlemen. Moreover, APMCs ensure that farmers receive prompt payment for their produce, reducing the risk of payment defaults.

The evolution of APMCs and their impact on farmers and consumers

The evolution of Agricultural Produce Market Committees (APMCs) is a significant aspect of agricultural and Indian economic history.

- **Pre-APMC Era:** Before the establishment of APMCs, agricultural marketing in India was largely unregulated and characterized by various intermediaries, leading to low price realization for farmers and an inefficient supply chain. Farmers were often exploited by traders and middlemen due to lack of transparency and competition,
- **Introduction of APMCs:** In the 1960s and 1970s, recognizing the need to provide a fair and transparent platform for farmers to sell their produce, many states in India started setting up APMCs. These committees were established under the Agricultural Produce Market Regulation (APMR) Acts, which aimed to regulate and streamline agricultural markets, ensure fair pricing, and eliminate exploitative practices.
- **Monopoly and Regulation:** Over time, the functioning of APMCs became subject to criticism due to issues such as monopoly control, lack of competition, and limited access to markets for farmers. In many cases, APMCs became hubs of corruption and rent-seeking behavior. Traders within these regulated marketplaces often formed cartels and manipulated prices to their advantage.
- **Reforms and Liberalization:** In the late 1990s and early 2000s, recognizing the limitations and inefficiencies of the APMC system, some states started implementing market reforms. These reforms aimed to introduce competition, increase private sector participation, and create alternative marketing channels for farmers. States like Karnataka and Maharashtra were among the early adopters of such reforms.
- **Model APMC Act and E-NAM:** In 2003, the Government of India recommended a Model APMC Act to encourage states to undertake reforms in their APMC systems. This model act proposed measures like direct marketing, contract farming, and private market yards, aiming to provide farmers with more choices in selling their produce. The Electronic National Agriculture Market (e-NAM) platform was also launched in 2016 to create a unified national market for agricultural commodities, enabling online trading and transparent price discovery.
- **Recent Developments and Challenges**: The evolution of APMCs continues to be a topic of debate and reform. In recent years, there has been discussion around the implementation of the Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020, as part of India's agricultural reform agenda. This act seeks to create an ecosystem where farmers can sell their produce outside the traditional APMC mandis, thus aiming to provide them with more options and better prices. However, these reforms have also faced opposition and protests from certain farmer groups who are concerned about potential exploitation by private corporations.
- The most notable reform in recent years came with the introduction of the **Agricultural Produce and Livestock Marketing (Promotion and Facilitation) Act, 2017,** commonly known as the APMC Act. This act aimed to liberalize agricultural markets by permitting farmers to sell their produce outside of the traditional APMC mandis (markets) and directly to consumers or private buyers. The act sought to create alternative marketing channels, such as electronic trading platforms and contract farming, enabling farmers to receive better prices for their produce.

Non-Governmental Organizations (NGOs):

Non-Governmental Organizations (NGOs) are private, non-profit organizations that work independently of government entities to address various social, economic, and environmental issues. In the context of the agricultural sector, NGOs play a significant role in promoting sustainable agricultural practices, rural developmentand the well-being of farmers.

Key roles of NGOs in the agricultural marketing ecosystem:

- **Farmers' Empowerment:** NGOs work closely with farmers to provide them with knowledge, skills, and resources to enhance their productivity, income, and overall livelihood. This includes training in modern farming techniques, crop diversification, and sustainable practices.

- **Market Linkages:** NGOs help farmers access markets beyond traditional APMC setups by establishing direct connections with buyers, exporters, and processors. This reduces the dependency on intermediaries and improves farmers' bargaining power.
- **Value Addition:** NGOs assist farmers in adding value to their produce through activities such as processing, packaging, and branding. This helps farmers command better prices for their products.
- **Advocacy and Policy Influence:** NGOs advocate for pro-farmer policies and reforms in the agricultural sector. They work to raise awareness about issues affecting farmers and influence policymakers to create a favorable environment for agricultural growth.
- **Rural Development:** NGOs often engage in holistic rural development initiatives, including education, healthcare, and infrastructure development, which indirectly contribute to improved agricultural marketing conditions.

Some institution and industry connect to NGOs for enhance sustainable agriculture

- **TechnoServe:** This NGO operates across various countries and specializes in building competitive farms and businesses. TechnoServe offers training programs that cover areas like improved agricultural practices, post-harvest handling and business management. By connecting farmers to markets and facilitating access to finance, TechnoServe helps farmers enhance their productivity and income.
- **Aga Khan Foundation:** With a focus on rural development, the Aga Khan Foundation works to improve agricultural practices and marketing opportunities for small-scale farmers. They provide training in sustainable farming techniques and connect farmers to markets through collective marketing initiatives, strengthening their bargaining power.
- **Market Development Facility (MDF):** MDF operates in the Asia-Pacific region, fostering economic growth by creating market opportunities. They collaborate with local partners to train farmers in producing high-quality goods that meet market demands. MDF also supports the development of market linkages and business relationships.
- **CARE International:** Through programs like the Rural Marketing Initiative, CARE assists farmers in gaining access to markets by forming producer groups and cooperatives. They provide training in market-oriented production, quality improvement, and negotiation skills, enabling farmers to receive fair prices for their produce.
- **Self Employed Women's Association (SEWA):** Operating mainly in India, SEWA empowers women farmers by providing training on sustainable agriculture practices and helping them access markets. SEWA focuses on enhancing women's participation in decision-making processes related to agricultural marketing.
- **Root Capital:** Concentrating on the financial aspect of agricultural marketing, Root Capital offers loans and financial training to farmer associations and agricultural enterprises. This enables these entities to invest in better production methods and access larger markets.
- **Mercy Corps:** Working in various regions, Mercy Corps' programs focus on improving agricultural productivity, post-harvest management, and market linkages. By building the capacity of local farmers and communities, they aim to create more resilient and prosperous agricultural systems.

Collaborative efforts: APMCs and NGOs

The collaboration between Agricultural Produce Market Committees (APMCs) and Non-Governmental Organizations (NGOs) holds significant promise for enhancing agricultural marketing outcomes. APMCs serve as critical intermediaries between farmers and consumers, facilitating the sale and distribution of agricultural produce. However, these traditional market structures often face challenges such as limited infrastructure, lack of transparency, and inadequate price realization for farmers. On the other hand, NGOs possess expertise in areas like capacity building, technology adoption, and community engagement.

Through strategic collaborations, APMCs and NGOs can address these challenges effectively. NGOs can contribute by imparting modern agricultural practices, conducting training sessions on post-harvest management, and promoting sustainable farming techniques. This knowledge transfer empowers farmers to improve the quality and quantity of their produce, thereby increasing their bargaining power at APMCs.

NGOs can also assist APMCs in adopting technology-driven solutions. This includes creating digital platforms for price discovery, market information dissemination, and direct farmer-consumer interaction. Such initiatives enhance transparency and reduce information asymmetry, ensuring that farmers receive fair prices for their products. Moreover, NGOs can facilitate financial literacy programs, helping farmers understand pricing mechanisms and avoid exploitative practices.

In return, APMCs can offer NGOs insights into local market dynamics and the specific needs of farmers. Collaborative efforts can lead to the creation of farmer-centric policies and infrastructural development plans. Furthermore, APMCs can provide logistical support for the distribution of resources and knowledge shared by NGOs.

The synergy between APMCs and NGOs also extends to advocating for farmers' interests. NGOs can play a crucial role in amplifying the voices of farmers, ensuring that their concerns reach policymakers and stakeholders. By harnessing their networks, NGOs can drive policy changes that lead to a more inclusive and equitable agricultural marketing system.

Identification of challenges in Agricultural Produce Market Committees (APMCs) and Non-Governmental Organizations (NGOs)

Major Challenges of APMCs:

- **Monopoly and Cartels:** In some cases, APMCs can become dominated by a few powerful traders or cartels, which can lead to unfair pricing practices and limited competition.
- **Lack of Infrastructure:** Many APMCs suffer from inadequate infrastructure, including storage facilities and transportation networks, leading to post-harvest losses and inefficiencies.
- **Middlemen Influence:** Despite their establishment to reduce middlemen, APMCs can sometimes still have intermediaries who extract a significant share of farmers' profits.
- **Regulation Complexity:** The regulatory framework governing APMCs can be complex and bureaucratic, hindering their ability to adapt to changing market dynamics.
- **Inefficient Operations:** APMCs often face inefficiencies in grading, pricing, and auction processes, leading to delays and higher transaction costs.

Major Challenges of NGOs:

- **Sustainability:** Many NGOs rely on donor funding, which can be inconsistent and uncertain, impacting their long-term sustainability and impact.
- **Limited Reach:** NGOs might not have the resources or capacity to reach all farmers, especially those in remote or marginalized areas, limiting their impact.
- **Coordination and Collaboration:** Collaborating with government agencies, other NGOs, and local communities can be challenging, requiring effective communication and coordination.
- **Capacity and Expertise:** Some NGOs might lack the necessary technical expertise or resources to provide comprehensive training and support to farmers.
- **Policy Influence:** Advocating for policy changes requires significant effort and engagement with policymakers, which can be time-consuming and complex.
- **Dependency:** In some cases, farmers might become overly dependent on NGO interventions, hindering their ability to develop independent skills and solutions.
- **Policy Gaps:**In both APMCs and NGOs, policy gaps can impede progress. APMCs might struggle with outdated regulatory frameworks that hinder the adoption of modern trading practices. This can deter private investment and limit the scope for value addition. On the other hand, NGOs often grapple with

inconsistent or conflicting policies related to rural development and funding allocation. These ambiguities hinder their ability to plan and execute long-term projects effectively.

Exploration of strategies to address these challenges and enhance the roles of APMCs and NGOs

Strategies for APMCs:

- **Modernization and Infrastructure Development :** Invest in upgrading APMC infrastructure, including storage facilities, cold storage, and processing units.Integrate technology for online trading platforms, price information dissemination, and e-auction systems to enhance transparency and reach.
- **Promote Competition :** Introduce measures to prevent monopolies and cartels by promoting healthy competition among traders and buyers.Allow private players to set up market yards and compete with APMCs, fostering a more competitive environment.
- **Strengthen Farmer Representation :** Ensure that farmers have a strong representation in APMC decision-making bodies to safeguard their interests.Establish grievance redressal mechanisms to address issues faced by farmers.
- **Price Information Dissemination :** Set up real-time price information systems that provide farmers with market prices, enabling them to make informed decisions.Use mobile apps, SMS alerts, and digital platforms to reach farmers in remote areas.

Strategies for NGOs:

- **Training and Capacity Building :** Provide training to farmers on modern agricultural practices, sustainable techniques, and efficient resource utilization.Conduct workshops on financial literacy, market trends, and negotiation skills to empower farmers in negotiations with buyers.
- **Market Linkages :** Facilitate direct market linkages for farmers by connecting them with potential buyers, exporters, and retail chains.Help farmers comply with quality standards and certifications required by different markets.
- **Advocacy and Policy Influence :** Collaborate with other NGOs, farmer associations, and advocacy groups to collectively push for policy changes that benefit farmers.Engage with policymakers to create an enabling environment for sustainable agricultural practices and fair pricing.
- **Technology Adoption :** Utilize digital tools to provide farmers with real-time market information, weather forecasts, and best practices.Offer virtual platforms for training and consultations, especially in areas with limited physical accessibility.

Collaborative Strategies:

- **Public-Private Partnerships (PPPs) :** Encourage collaboration between APMCs, NGOs, and private companies to create integrated value chains and access to markets.Leverage the strengths of each stakeholder to improve the overall efficiency of the agricultural marketing system.
- **Localized Solutions :** Implement pilot projects in specific regions to test and refine strategies before scaling up.Tailor interventions to the specific needs and challenges of different agricultural communities.
- **Data-driven Decision Making :** Collaborate with technology providers to gather and analyze data on market trends, price fluctuations, and demand patterns.Use data insights to guide farmers' decisions and inform policy advocacy efforts.
- **Knowledge Sharing and Networking :** Organize workshops, conferences, and knowledge-sharing platforms where APMCs, NGOs, farmers, and experts can exchange ideas and experiences.Foster a network that supports continuous learning and adaptation

Conclusion:

A collaborative approach that harnesses the strengths of both APMCs and NGOs is crucial. Modernizing APMCs with transparent, tech-driven platforms and promoting competition can enhance their efficiency and fairness. Simultaneously, NGOs can address their challenges by seeking diversified funding sources,

expanding their reach through digital solutions, and fostering stronger partnerships with government bodies.APMCs and NGOs together form a dynamic duo capable of shaping the future of Indian agricultural marketing. By addressing their respective challenges and leveraging their strengths, they can create a more inclusive, efficient, and resilient system that empowers farmers, enhances market access and contributes to sustainable agricultural growth. Collaborative efforts will be instrumental in realizing their potential and transforming the agricultural landscape for the better.

Reference

Acharya, S. S. (2006). Agricultural marketing and rural credit for strengthening Indian agriculture.

Husain, M. (2015). Agriculture marketing and rural credit for strengthening Indian Economy. *ZENITH International Journal of Business Economics & Management Research,* 5(9), 1-8.

Patel, A., Sharma, M., and Pandya, M. (2007). Public Private Partnership (PPP) Approach-for sustainable development of APMCs in Gujarat.

Prajapati, K. B. (2022). Agriculture Development and Government Support. *IAHRW International Journal of Social Sciences Review,* 10(3).

Selvaraj, M., & Ibrahim, M. S. (2012). Indian agricultural marketing-A review. *Asian Journal of Agriculture and Rural Development,* 2(1), 69-75.

Siddappa, P., & Shekhar, B. Marketing Efficiency of Agricultural Commodities. *Archers & Elevators Publishing House.*

Singh, N., Shukla, R., Bhatt, B. K., More, S. S., & Meena, P. C. (2016). Role of state interventions in marketing of horticultural crops in Gujarat. *Splint International Journal of Professionals,* 3(4), 150-160.

Singh, R. K., &Sonker, V. Globalization and Agricultural Marketing: An Indian Scenario. HermeneuticS.

Sinha, S. (2021). Role of Law in Recent Agricultural Reforms Made in India. *Indian JL & Legal Rsch.,* 2, 1.

Vyas, V. S. (2022). The changing role of government in Indian agriculture. *Journal of Social and Economic Development,* 24(Suppl 1), 209-227.

LP 2.1

Role of Information Communication Technology in transfer of technology

Umesh R. Chinchmalatpure
Associate Professor and Chief Extension Education Officer
Directorate of Extension Education, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
Email: rcumesh@rediffmail.com

Introduction

Agriculture is the backbone of India's economy as two-third of the population lives in rural areas and directly or indirectly depends on agriculture for their livelihood. It is one of the market-driven industries that employ a large segment of the country's population. India's food production has improved significantly during the last three decades due to all-round efforts but Indian agriculture is still facing a multitude of problems to maximize productivity to feed the continuously increasing population. Now-a-days Information and Communication Technology (ICT) plays a vital role in every sector of development. ICT provides farmers various latest technologies and improves their farm income

Access to information and improved communication is a prerequisite for sustainable agricultural development. The use of information and communication technology (ICT) is an important pillar of agriculture extension and different sources and channels of agriculture information can play important role to meet the requirement. The use of modern information technology needs to be promoted for communication among scientists, extension workers and farmers to transfer the information and new technologies in a cost effective manner. An increased access to the scientific knowledge and information through information technology will help people specially the rural communities in making informed decisions and solving their problems by applying scientific methods.

ICT has become one of the most significant growth catalysts for the Indian economy, contributing significantly to the country's economic growth and welfare. With the launch of 5G, India is now prepared for the next phase of growth in its IT revolution. Increased digitization, availability of technically skilled labour, burgeoning start-up ecosystem, and strong growth in IT export will drive the ICT sector in 2023.

Concept of ICT

ICT refers to all information and communication systems and technologies including the digital formats such as the Internet, but also interfaces with radio, cable and wireless television, cellular phone and print media; as well as the various services and applications associated with them, such as video-conferencing and distance learning.

ICT is broader than Information Technology (IT) to include the field of electronic communication in addition to IT. ICTs are those technologies that can be used to interlink IT devices such as personal computers (PCs) with communication technologies such as telephones and their telecommunication networks. The PC and laptop with e-mail and Internet provides the best example.

Information and Communications Technology (ICT) is the body of knowledge, methods, procedures and technical equipment, which ensures acquisition, storage and dissemination of any information using computers and telecommunications tools.

ICT refers to all communication technologies, including radio, television, internet, wireless networks, cell phones, computers, software, video-conferencing, social networking and other media applications and services enabling users to access, retrieve, store, transmit, and manipulate information in a digital form.

Information communication technologies (ICTs) have been transforming agriculture globally. ICT is the convergence of microelectronics, computing and telecommunications.

ICT is a term used to describe a range of technologies for gathering, storing, retrieving, processing, analysing and transmitting information. ICTs have a possibility of strengthening the linkage between extension, research and farmers.

Need of Information Communication Technology (ICT)

ICT tools can be used to find, explore, analyze, exchange and present information responsibly and without discrimination. ICT can be employed to give users quick access to ideas and experiences from a wide range of people, communities and cultures.

The challenge of transformation and the increasing need to modernize administrative practices and management systems has become a major task for governments worldwide. Governments remain the largest repository of data on a vast array of topics and interest. It means that government must be willing to take the initiative to make data available to the citizens after putting into consideration necessary policies to regulate uses and data exchange.

ICT allows use of exciting and innovative ways to provide life-long knowledge seekers with global access to information.

ICT provides information systems that are seamlessly linked to learning support systems, that are enjoyable to use and when used in partnership with the public and private sectors have the capability to generate economic growth and assist development.

ICT has progressively reduced the costs of managing information, enabling individuals and organisations to undertake information-related tasks much more efficiently, and to introduce innovations in products, processes and organisational structures.

ICT initiatives for agricultural development in India

ICT initiatives in Indian agriculture acts as a decision support system for agricultural extension personnel who has to decide what advice to be offered to farmers who have to decide what action to be taken based on it. It is the one of the modern and most efficient extension tool to take the technology from scientists to the farmers directly without any dilution of the content. The different ICT initiatives has been started by government, non-government organization and private agencies for agriculture and allied sectors are- Gyandoot project (Madhya Pradesh); Warana Wired Village project (Maharashtra); Information Village project of the M S Swaminathan Research Foundation (MSSRF) (Pondicherry); iKisan project of the Nagarjuna group of companies (Andhra Pradesh); Automated Milk Collection Centres of Amul dairy cooperatives (Gujarat); Land Record Computerisation (Bhoomi) (Karnataka); Computer-Aided Online Registration Department (Andhra Pradesh); Online Marketing and CAD in Northern Karnataka (Karnataka); Knowledge Network for Grass Root Innovations Society for Research and Initiatives (SRISTI) (Gujarat); Application of Satellite Communication for Training Field Extension Workers in Rural Areas (Indian Space Research Organisation). In addition to the above, a few non-governmental organisations (NGOs) have initiated ICT projects such as: Tarahaat.com by Development Alternatives (Uttar Pradesh and Punjab); Mahitiz-samuha (Karnataka); VOICES – Madhyam Communications (Karnataka); Centre for Alternative Agriculture Media (CAAM); Some exclusive agricultural portals are also available, such as: Haritgyan.com, Krishiworld.net, TOEHOLDINDIA.com, Agriwatch.com, ITC's Soyachoupal.com, Acquachoupal.com, Plantersnet.com, etc.

- **Gyandoot project (Madhya Pradesh):** The Gyandoot project was initiated in 1st January 2000 in Dhar district of Madhya Pradesh, as an e-commerce and e-governance activity, with the objective of providing useful information to people in rural areas, and also to act as an interface between the district government and ordinary people. The goal of the Gyandoot project has been to establish community-owned, technologically innovative and sustainable information kiosks in a poverty-stricken, tribal dominated rural area of Madhya Pradesh. Kiosks have been established in the village Panchayat buildings. Information kiosks have dial-up connectivity through local exchanges on optical fibre or UHF links. The server hub is a Remote Access Server housed in the computer room in the District Panchayat. User fees are charged at the kiosks for the services provided. Local rural youth act as entrepreneurs, running these information kiosks along commercial lines.
- **MSSRF:** The M. S. Swaminathan Research Foundation (MSSRF) is a non-profit organization in India that works towards sustainable agricultural development and rural livelihoods. The Village Knowledge

Center (VKC) is one of the programs run by the MSSRF. The Village Knowledge Centres (VKCs) are a network of rural resource centres that provide farmers and rural communities with access to information and services related to agriculture, health, and livelihoods. VKCs are set up in villages and aims to bridge the gap between research and rural communities by providing farmers with access to information and services related to agriculture, health, and livelihoods. The centers provide a range of services including access to information on agriculture, health, and livelihoods; training on sustainable agriculture and livelihoods; and support for farmers' groups and community-based organizations. The VKC also serves as a platform for farmers to share their experiences and knowledge. This program aims to empower rural communities by providing them with the information and services they need to improve their livelihoods and adapt to the challenges of a changing environment.

- **Warana Wired Village Project:** The Warana Wired Village Project is a rural development initiative in India that aimed to provide internet connectivity and digital services to the Warana valley region of Maharashtra state. The project was launched in 2000 by the Warana Co-operative Sugar Factory Ltd. in collaboration with the Government of Maharashtra and various other partners. The project aimed to provide internet connectivity and digital services to the Warana valley region of Maharashtra state and also to provide training to the farmers and rural citizens in the use of computers and the internet. The project also aimed to bridge the digital divide between urban and rural areas, and to provide access to information and services related to agriculture, health, education, and livelihoods. The project also aimed to promote e-commerce and telemedicine services in the region. The goal of the project was to empower rural communities by providing them with access to information and services that would improve their livelihoods and standard of living
- **ITC E-Chaupal:** It is an e-governance initiative of ITC Limited, a unique web-based page, to link directly with rural farmers via the Internet for procurement of agricultural and aquaculture products like soybeans, wheat, coffee, and prawns. The initiative was launched in 2000 by the Indian multinational corporation, ITC Limited (formerly known as Indian Tobacco Company). e-Choupal initiative uses ICT to provide farmers with access to information on weather, market prices, and agricultural best practices, as well as to connect them directly with buyers. This enables farmers to make more informed decisions about what to grow and when to sell, which in turn improves their income and livelihoods. The e-Choupals also provide a platform for farmers to share information and experiences, and for extension workers and researchers to test and disseminate new technologies and practices. The e-Choupals consist of a network of rural kiosks equipped with computers and internet connectivity, where farmers can access information and services. The kiosks are typically located in rural areas and managed by trained local entrepreneurs. The e-Choupals have been implemented in many states in India, and have been recognized for their potential to improve rural livelihoods and bridge the digital divide between urban and rural areas.
- **Bhoomi Project:** Bhoomi is a project jointly funded by the Government of India and the Government of Karnataka to digitize the paper land records and create a software mechanism to control changes to the land registry in Karnataka. The project was designed to eliminate the long-standing problem of inefficiency and corruption in the maintenance of land records at dispersed and poorly supervised and audited block-level offices known as "taluka" offices in South India and "tehsildar" offices in North India. The project development and implementation was done by National Informatics Centre.
- **Kisan Call Center (KCC) (Toll Free No.1800-180-1551):** The Department of Agriculture & Cooperation (DAC), Ministry of Agriculture, Govt. of India launched Kisan Call Centers on January 21, 2004 across the country to deliver extension services to the farming community. The purpose of these call centers is to respond to issues raised by farmers, instantly, in the local language. There are call centers for every state which are expected to handle traffic from any part of the country. Queries related to agriculture and allied sectors are being addressed through these call centers instantly, in the local language by the experts of State departments, SAUs, ICAR institutions etc. There are call centres for every state which are expected to handle traffic from any part of the country. SMS using telephone and

computer interact with farmers to understand the problem and answer the queries at a call centre. The infrastructure is placed at three locations namely-a professionally managed call centre (level-I), a response centre in each organization, where services of SMS are made available (level-II) and the Nodal Cell (level-III).

- **Agri Business Centres:** It provides a web based solution to the small and medium farmers as well as owners of large landholdings. It brings on a single platform all the stakeholders in agribusiness like farmers and farmer groups, institutions and autonomous bodies, agro machinery and farm equipment makers, cold chain tech., commodity brokers, cooperatives, food processors, pre and post-harvest management experts, packaging technology providers, insurance companies, warehousing and logistics agencies, surveyors and certification agencies.
- **Tata Kisan Kendra:** The concept of precision farming being implemented by the TKKs has the potential to catapult rural India from the bullock-cart age into the new era of satellites and IT. TCL's extension services, brought to farmers through the TKKs, use remote-sensing technology to analyze soil, inform about crop health, pest attacks and coverage of various crops predicting the final output. This helps farmers adapt quickly to changing conditions. The result: healthier crops, higher yields and enhanced incomes for farmers. ITC's Agri Business Division launched "e-Choupal" in June 2000 in which village internet kiosks managed by farmers called sanchalaks themselves, enable the agricultural community access ready information in their local language on the weather & market prices, disseminate knowledge on scientific farm practices & risk management, facilitate the sale of farm inputs (now with embedded knowledge) and purchase farm produce from the farmers' doorsteps (decision making is now information-based).
- **Aaqua (Almost all question answered):** It is a method of problem-solving intended to address both little and major issues faced by Indian farmers. Depending on the difficulty, responses to your Agri-related questions are answered in 24 to 72 hours. Experts work for their respective companies and provide their services for free. Language: Hindi, Marathi, English Collaboration of IIT Bombay, KVK, Vigyan Ashram (Dept. of Science and Technology, Govt. of India).
- **Digital Green:** Digital Green is a non-profit organization that uses digital technology to improve the lives of smallholder farmers in developing countries. The organization creates videos that demonstrate best practices for farming and other rural livelihood activities, and then disseminates the videos through community networks to reach farmers who may not have access to traditional forms of extension services. The organization also provides training and support to local partners to help them create and disseminate their own videos. Digital Green has been implemented in many countries like India, Ethiopia, Ghana, Nigeria, and has impacted many farmers livelihoods (Sarvan Raj, 2007).
- **VASAT:** VASAT (Virtual Academy for the Semi-Arid Tropics) is an online platform that provides training and education on sustainable land management in semi-arid regions. The platform aims to empower farmers and other stakeholders in dryland areas with the knowledge and tools they need to improve their livelihoods and adapt to the challenges of climate change. VASAT offers a range of educational resources, including videos, interactive simulations, and quizzes, as well as opportunities for online collaboration and networking. The program is developed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in collaboration with various partners.
- **ISRO-Village resource centre:** A Village Resource Centre (VRC) is a community-based facility that provides rural residents with access to information and services related to agriculture, health, and livelihoods. The VRCs aim to bridge the gap between rural communities and the resources they need to improve their livelihoods. They typically provide a wide range of services, including training on sustainable agriculture and livelihoods, access to information on agricultural practices, health, and other topics, and support for farmers' groups and community-based organizations. VRCs also serve as a platform for farmers to share their experiences and knowledge, and for extension workers and researchers to test and disseminate new technologies and practices. The goal of VRC is to empower rural

communities by providing them with the information and services they need to improve their livelihoods and adapt to the challenges of a changing environment.

- **DACNET:** DACNET (Digital Advancement of Agriculture in India Network) is an e-governance project of the Government of India that aims to provide farmers and other stakeholders in the agriculture sector with access to information and services related to agriculture. The project is implemented by the Department of Agriculture, Cooperation, and Farmers Welfare (DACFW) under the Ministry of Agriculture and Farmers Welfare. The project aims to provide a wide range of services to farmers, including access to information on weather, market prices, and other topics; training on sustainable agriculture and livelihoods; and support for farmers' groups and community-based organizations. DACNET also provides services to the department of agriculture such as online submission of crop cutting experiment data, online distribution of fertilizers, pesticides and seeds, and online monitoring of various schemes and programmes. The goal of the project is to empower farmers and other stakeholders in the agriculture sector by providing them with the information and services they need to improve their livelihoods and adapt to the changing environment.
- **iShakti:** Ishakti is an e-governance project in India that aims to provide farmers with access to information and services related to agriculture, health, and livelihoods. The project is implemented by the M. S. Swaminathan Research Foundation (MSSRF) and is supported by the Government of India. The project uses ICT (Information and Communication Technology) tools such as mobile phones, tablets, and computers to deliver information and services to farmers. The project aims to provide farmers with access to real-time market prices, weather forecasts, and other information that can help them make informed decisions about their crops. The project also aims to provide farmers with access to financial services, such as microfinance and insurance, and to connect them with buyers and suppliers. iShakti is an innovative way of providing extension services to farmers by leveraging the power of technology and mobile phones. By providing farmers with access to real-time information and services, the project aims to improve their livelihoods and promote sustainable agricultural development.
- **IFFCO Kisan Sanchar Ltd.:** IFFCO Kisan Sanchar Limited (IKSL) is a subsidiary of Indian Farmers Fertilizer Cooperative Limited (IFFCO), one of the largest cooperative societies in India. IKSL provides mobile-based services to farmers to help improve their livelihoods and increase agricultural productivity. IKSL's services include providing farmers with information on weather, market prices, and crop management, as well as access to financial services such as microfinance and insurance. The company also offers a variety of value-added services such as e-commerce, telemedicine, and e-governance services. Through its mobile platform, farmers can also connect with buyers and suppliers, and access a range of other services such as soil testing and crop insurance. IKSL's mission is to empower farmers with information and services that can help them improve their livelihoods and increase agricultural productivity. Through its mobile platform, farmers can access a range of services that can help them make more informed decisions and increase their income.
- **e-Sagu:** e-Sagu is an online platform agro-advisory system being developed since 2004 that aims to provide real-time information to farmers about the market prices of various crops, weather forecast, and other agricultural-related information. The word 'Sagu' means 'cultivation' in Telugu language. It aims to improve farm productivity by delivering high quality personalized (farm-specific) agro-expert advice in a timely manner to each farm at the farmers door-steps without farmer asking a question. The advice is provided on a regular basis (typically once a week) from sowing to harvesting which reduces the cost of cultivation and increases the farm productivity as well as quality of agri-commodities. The platform also aims to connect farmers with buyers, agri-input dealers and other service providers to ensure better prices for their produce and timely availability of inputs. The website also has information on various government schemes, policies, and programs related to agriculture.
- **e-KRISHI VIPANAN:** It professionalizes and reorganizes the agriculture trading business of Mandi Board by installing cost effective digital infrastructure using latest advancement in ICT by collecting and

delivering real time information, online. It makes the operations more effective, totally transparent, benefiting all stake holders (farmers, traders & the government), empowering them through accurate and timely information for effective decision making.

- **e-Arik (e- Agriculture):** By enhancing access to information and knowledge sharing, ICT-based agricultural education has the potential to strengthen farming communities. One such project that makes use of ICT as a teaching tool is the Village Knowledge Centres in North East India.
- **e-Extension (Soil health card programme):** The Soil Health Card (SHC) program is a government initiative in India to provide farmers with information about the health of their soil. The program aims to help farmers improve crop yields and soil fertility by providing them with regular soil test results and recommendations for nutrient management. E-Extension is a digital platform for the Soil Health Card program, which allows farmers to access their soil test results and recommendations electronically, rather than receiving a physical card. The farmers can access their soil test results, recommendations for nutrient management and also get information about various other schemes and programmes through the e-Extension portal. This enables farmers to access their soil information at any time and from any location, improving the efficiency and accessibility of the program.
- **e-NAM:** The main objectives of e-NAM are to promote uniformity in agriculture marketing, remove information asymmetry in the market and promote real-time price discovery. Small Farmers' Agribusiness Consortium (SFAC) is the lead promoter of National Agricultural Market (eNAM). SFAC is formulated under the Department of Agriculture, Cooperation & Farmers' Welfare (DAC&FW). SFAC through open tender selects a Partner to develop, operate, and maintain the NAM e-platform.

Advantages of ICT

Use of Information Communication Technologies (ICT) in various sectors offer many advantages such as save manpower, eliminate human errors, enable faster communication and exchange of ideas, save time, avoid duplication efforts, improve quality, enable total automation, improve the way of working, increase productivity, create and expand markets and grow economy. Some more advantages of ICTs in agricultural development are :

- Online services can be provided through the ICT for information, education, training, consultation, diagnosis, monitoring, transaction and processing.
- It can be helpful in facilitating the interaction among the researchers, extension workers and farmers.
- It can provide a question and answer services. Here, experts respond to the queries on the specialized subjects.
- It helps in providing up-to-date information services to farmers such as market information, weather forecasting, input supply, credit availability, etc.
- It helps in creation of database of local resources of villages and the villagers, site specific information system, expert system etc.
- It helps in providing information services on disease/pest early warning system, information regarding rural development programmes, crop insurance and post-harvest technology.
- It helps in facilitation of land records and online registration services.
- It helps in improving the marketing of milk and milk products.
- It provides tele-education to farmers.
- It can extend services regarding farm business and management information to the farmers.

Conclusion

Any knowledge transfer should take into account farmers' point of view, with the aim of building on their knowledge and capitalize on it. ICT projects on transfer of technology will depend on many factors such as type of ICT project, the target population, infrastructure and resources available, and the level of adoption and

usage. The advancements and availability of ICT's has been the greatest communications revolution in recent years. Despite the huge potential to harness ICT for agricultural development, only a few isolated projects have been initiated in India and a few in other parts of the world. By taking these lessons from these projects into account, different organizations can develop more effective ICT projects for agricultural extension that can help to improve farmers' livelihoods and increase agricultural productivity.

References:

Anil Kumar Rohila, Krishan Yadav and B. S. Ghanghas (2017). Role of Information and communication technology (ICT) in agriculture and Extension. Journal of Applied and Natural Science 9 (2): 1097 -1100

Dash, S. S., Kanungo, A. P. and Behera, R. K. 2021. Information Communication Technology (ICT) Initiatives in Indian Agriculture. Vigyan Varta 2(10): 46-48

Meera, S. N.; Jhamtani, A. and Rao, D.U.M. (2004). Information and communication technology in agricultural development: a comparative analysis of three projects from India. Agricultural Research & Extension Network, Network Paper No.135.

Nandeesha, H., & Thimmaiah, N. (2016). ICT Programmes and Policies for Agricultural Extension in India: A Review. Journal of Media and Social Development, 4(2), 78- 89.

Saravanan, R., (2014) (Ed.). Mobile Phones for Agricultural Extension: Worldwide mAgri Innovations and Promise for Future, New India Publishing Agency, New Delhi.

Saravanan Raj and Bhattacharjee Suchiradipta (2015). Role of ICTs in Family Farming: Experiences and Way Forward. In: M.L. Choudhary and Aditya (2015) Family Farming and Rural Economic Development. New India Publishing Agency, New Delhi.

Shivani Jha, S. K. Kashyap, M. A. Ansari, Pragya Goswamy and Smriti Singh (2021). Information Communication Technology: A Communication Tool for Women Empowerment. Int.J.Curr.Microbiol.App.Sci. 10(01): 578-583.

Singh, V., Sankhwar, S., & Pandey, D. (2015). The role of information communication technology (ICT) in agriculture. Global Journal of Multidisciplinary Studies, 3(4), 2-10.

Singh, K. M., Kumar, A., & Singh, R. K. (2015). Role of Information and Communication Technologies in Indian Agriculture: An Overview (SSRN Scholarly Paper ID 2570710). Social Science Resear

LP 2.2

Empowering agriculture transformation: The vital role of ICT in technology transfer

Aparna Jaiswal
Assistant Professor
Department of Extension, College of Agriculture, JNKVV, Jabalpur

Introduction

In recent years, the global agricultural sector has undergone a remarkable transformation, and at the heart of this revolution lies the integration of Information and Communication Technologies (ICT). The transfer of cutting-edge technologies from various sectors into agriculture has unleashed a wave of innovation and productivity that is reshaping the way we cultivate, manage, and distribute food. This transformation is not only enhancing agricultural practices but also addressing some of the most pressing challenges facing the industry, such as food security, sustainability, and resource efficiency. In this discourse, we will look into into the profound impact of ICT on the agricultural sector and how the transfer of these technologies is driving extraordinary changes in farming, agribusiness, and the entire food supply chain.

ICT plays a key role agricultural transfer of technologies in agricultural sector by providing the rapid transmission and access to such real –time data. ICT contribution is crucial in many domains, as it enables timely decision making, responsiveness and monitoring of dynamic situations.

- Agricultural Information: ICT provides farming community with access to a vast amount of agricultural real-time information which includes crop management techniques, pest control methods, weather forecasts, and market prices. This information is most essential for the holistic development of farming community to stay updated and informed.
- E-Learning tools and Webinars: TOT programs can be well integrated with e-learning platforms and that was the main reason why we were able to connect with the other part of the world during pandemic by means of webinars, making it easier for trainers to access training materials and resources remotely. This flexibility enables trainers to enhance their knowledge and skills without the need for physical presence.
- Mobile Apps: Number of mobile applications have been designed and developed to provide users with on-the-go access to agricultural data and resources. These apps are user friendly, multi-linguistic and have interactive tools for farm management, disease diagnosis, and yield estimation.
- Video Conferencing: ICT facilitates virtual meetings and video conferences, allowing users to collaborate with experts and fellow trainers across geographical boundaries. This promotes knowledge sharing and peer learning.
- Data Collection and Analysis: ICT tools, such as smartphones and tablets, enable trainers to collect and analyze data more efficiently because of number of smart tools which helps in better editing and presentation in various forms like pie chart, bar diagrams etc. This data-driven approach helps in identifying agricultural trends and best practices.
- Remote Sensing and GIS: Remote sensing technologies, coupled with Geographic Information Systems (GIS), provide users with valuable insights into land use, soil quality, and crop health. This information aids in making valuable, precise and informed decisions about agricultural practices.
- Market Access: ICT can connect trainers and farmers to online marketplaces, helping them access a broader customer base and secure better prices for their agricultural products.
- Weather Forecasting: Access to real-time weather information through ICT allows trainers to advise farmers on optimal planting and harvesting times, reducing crop losses due to adverse weather conditions.
- Precision Agriculture: ICT tools like drones and GPS systems enable trainers to teach precision agriculture techniques, which can increase crop yields and minimize resource use.
- Data Sharing and Collaboration: Online platforms and social media can facilitate information exchange and collaboration among users, researchers, and farmers, creating a community of practice focused on agricultural improvements.

In summary, ICT empowers users like Scientists, farmers, researches, students etc in agriculture by providing them with access to information, training resources, and tools that enhance their knowledge and enable them to deliver more effective and up-to-date information. This, in turn, contributes to the overall improvement of agricultural practices and productivity.

Application of ICT in agriculture

- Information and Communication Technology (ICT) has numerous applications in agriculture, which can help improve productivity, sustainability, and efficiency in the industry. Here are some key applications:
- Precision Agriculture: ICT tools like GPS, drones, and sensors enable farmers to precisely manage resources such as water, fertilizers, and pesticides. This helps optimize crop yields and reduce waste.
- Weather Forecasting: Access to real-time weather data through mobile apps or online platforms helps farmers make informed decisions regarding planting, harvesting, and pest control.
- Farm Management Software: Software applications assist farmers in planning, record-keeping, and analyzing data related to crops, livestock, and finances. These tools streamline farm operations.
- Market Information: ICT provides farmers with access to market prices and trends. They can make better decisions about when and where to sell their produce for maximum profit.
- Mobile Farming Apps: Mobile apps offer guidance on planting, pest control, and disease management. Farmers can also seek advice from experts through these apps.
- Remote Monitoring: IoT devices and sensors can monitor soil conditions, water levels, and livestock health remotely. Farmers receive real-time updates and can take timely actions.
- E-Agriculture: Online platforms connect farmers with buyers, sellers, and government agencies. E-auctions and digital payments facilitate transactions.
- Farm-to-Table Traceability: ICT can track the journey of food products from the farm to consumers, ensuring quality and safety standards are met.
- Livestock Management: RFID tags and electronic monitoring systems help farmers track the health, location, and breeding patterns of livestock.
- Education and Training: ICT tools offer online courses and resources for farmers to enhance their knowledge and skills.
- Smart Irrigation: Automated irrigation systems use sensors and data analysis to optimize water usage, reducing water wastage.
- Farm Safety: ICT can provide safety alerts and guidelines for handling hazardous materials or machinery on the farm.
- Predictive Analytics: Data analytics and machine learning can predict disease outbreaks, pest infestations, and crop yields, allowing farmers to take preventive measures.
- Financial Services: ICT enables farmers to access microfinance, insurance, and credit services, helping them manage financial risks.
- Supply Chain Management: ICT tools streamline the movement of agricultural products from farms to processing facilities and distribution centers.

These applications make obvious how ICT has revolutionize agriculture by making it more data-driven, efficient, and sustainable. The adoption of these technologies benefit both small-scale and large-scale farmers, leading to increased food production and better livelihoods.

Challenges that needs to be addressed

While Information and Communication Technology (ICT) offers significant benefits to agriculture, it also comes with several challenges that need to be addressed for successful implementation:

- Access to Technology: In many rural areas, farmers may lack access to the necessary ICT infrastructure, including reliable internet connectivity and electricity, which hinders their ability to use these tools effectively.
- Digital Literacy: Farmers, especially in remote areas, may have limited digital literacy, making it difficult for them to navigate and use ICT tools and applications.
- Cost of Technology: Purchasing and maintaining ICT equipment and software can be expensive for small-scale farmers, limiting their ability to invest in these technologies.

- Data Privacy and Security: Concerns about data privacy and security can deter farmers from adopting ICT solutions, especially when dealing with sensitive farm and financial data.
- Infrastructure and Maintenance: Keeping ICT infrastructure operational in challenging agricultural environments can be a significant challenge, as it may require ongoing maintenance and technical support.
- Interoperability: Interoperability is the ability of computer systems or software to exchange and make use of information. So, the compatibility issues between different ICT systems and devices can arise, making it difficult to integrate various technologies seamlessly.
- Language and Localization: Many ICT tools are developed in languages that may not be accessible to all farmers, and they may not be localized to suit the specific needs and practices of a region.
- Limited Customization: Some off-the-shelf ICT solutions may not be customizable to address the unique needs of different farming practices and crops.
- Weather and Environmental Factors: Extreme weather conditions and environmental factors can disrupt ICT infrastructure and sensors, affecting their reliability.
- Dependency on External Services: Farmers who rely heavily on ICT may face challenges if the service providers or platforms they depend on experience downtime or disruptions.
- Regulatory and Policy Issues: Regulations and policies related to ICT in agriculture may not be well-defined or may hinder the adoption of certain technologies.
- Data Overload: Collecting a large amount of data through ICT can overwhelm farmers. They may need support in managing and interpreting this data effectively.
- Social and Cultural Factors: Resistance to change, traditional farming practices, and cultural factors can inhibit the adoption of ICT in agriculture.
- Environmental Impact: The production and disposal of ICT equipment can have environmental consequences, raising questions about sustainability.
- Skill Gap: There may be a shortage of skilled professionals who can develop, implement, and support ICT solutions in rural agricultural areas.

Addressing these challenges requires collaboration between governments, technology providers, agricultural organizations, and local communities. It's important to adapt ICT solutions to the specific needs and interest of farmers, provide training and support, and ensure that the benefits of these technologies are accessible to all, including smallholders and those in remote areas.

Conclusion

The infusion of Information and Communication Technologies (ICT) into the agricultural sector through the transfer of technologies has guided in an era of unprecedented progress and promise. As we've explored throughout this discussion, ICT has revolutionized every facet of agriculture, from precision farming and data-driven decision-making to supply chain optimization and market access for farmers.

This transformation is not just about increasing crop yields or boosting farm incomes; it represents a crucial step towards addressing some of our world's most burning challenges. ICT-enabled agriculture offers solutions to feed a growing global population, conserve natural resources, reduce waste, and promote sustainable practices. It empowers farmers with knowledge, connects them to markets, and fosters resilience in the face of climate change and uncertain conditions.

However, for this transformation to continue reaping its full benefits, it requires ongoing collaboration between governments, private sectors, research institutions, and the farming communities themselves. The equitable distribution of ICT tools and knowledge must be a priority to ensure that smallholder farmers and rural communities also benefit from this revolution.

As we move forward, it is clear that the fusion of ICT and agriculture holds the key to a brighter, more sustainable future for food production. By embracing these technologies and fostering innovation, we can build a resilient agricultural sector that not only feeds the world but does so in a way that is efficient, environmentally friendly, and economically viable. The journey has begun, and the possibilities are boundless as we continue to transform the agricultural landscape through the transfer of technologies.

LP 2.3

E-agriculture and rural development in India

N. B. Jadav[1], K. P. Vaghasiya[2] and P. B. Raviya[3]

1Director of Extension Education, Junagadh Agricultural University, Junagadh

2 and 3Ph. D., Department of Agril. Extension, College of Agriculture, JAU, Junagadh

E-mail: dr_nbjadav@jau.in

Introduction

India is a developing country among world nations in which web-based communications and its diverse benefits were enjoyed only the urban and semi urban people. E-agribusiness portrays a rising field concentrated on the upgrade of agriculture and its products and the country advancement through enhanced data and correspondence forms. E-farming includes the conceptualization, outline advancement, assessment, and utilization of inventive approaches to utilize data and correspondence innovations in the rustic space, with an essential spotlight on horticulture. In 2008, the United Nations introduced to e-horticulture as "a rising field", with the desire that its extension would change and develop the rural areas. E-agribusiness Strategy gives a structure to comprehensively address the ICT openings and difficulties in the horticultural part in a more proficient way while producing new income streams and enhance the occupations of the country network and additionally guarantee the objectives of the national farming end-all strategy are accomplished. The presence of e-horticulture technique and its arrangement with other government designs will avoid e-farming tasks and administrations from being actualized in disengagement. E-horticulture strategy guide was produced by the Food and Agriculture Organization and the International Telecommunication Union with help from accomplices, including the Technical Centre for Agricultural and Rural Cooperation as a system for nations in building up their national e-agribusiness tactic/end - all policies. Plentiful future for successful use of ICT in agriculture and initiatives are gifted. However, much remains to be prepared. The execution of these subsequent recommendations can help to take in the full prospective of ICT in agriculture and recover rustic livelihoods (Pradhan and Mohapatra, 2019). The utilization of diagonal circulation channels, through which can be sold extensive amounts of merchandise. These channels are: grocery stores, natural shops specific, processors and different middle people. A few buyers need a closer connect with makers, need to hear the account of the item since they put their trust in the individuals who deliver and move these items, and certainty is second rate if the firm is significantly further away (Atanasoaie, 2017). Website quality has an oblique effect on the online purchase purpose of green food products, practitioners should also make the parallel value of their online stores with customers' expectations. To increase the level of online purchase intention, e-retailers should acquire relevant marketing strategies which include creating awareness of the benefits of green products to the public, establishing affiliate network and conducting constant promotions to their objective audience. It is important to understand that website quality is not the only decisive factors that could increase consumer purchasing target. Other qualities such as good customer service, efficient product distribution and logistics and also activist reviews from customers also play an important responsibility (Jasur and Haliyana, 2015).

Rural development

Country's advancement is a powerful strategy, which is essentially stressed with the provincial domains. Rural development aims at finding ways to improve rural lives with the participation of rural people themselves, so as to meet the required needs of rural communities. These include cultivating advances, budget and social system establishment, reasonable pay as well as cabin and house goals for the landless, town administration, general prosperity, preparation and utilitarian capability and correspondence and so on. The progress of our nation with a point of view to improve the individual fulfilment of the common people is said to be provincial improvement. The saying of the rustic improvement is to accomplish the accompanying four factors, for example, raised monetary development, raise in pay of the country masses, freedom of provincial masses both political astute just as efficient, and insightful to empower simple access to different assets like instruction, restorative care, openings for work, etc. Consistence of natural creation to feasible

advancement and change in buyer conduct and request towards sound and safe nourishment isn't sufficient. Market costs are a key component in the buyers' choice made by clients on one hand and in the generation, choice made by makers on the other. The simple directly to use to overall markets and great to acquire costs of simple materials, forms the division in the nation send out arranged. The investigation explores some critical issues in the natural homestead productivity and the impact of the European and the state bolster (Varun and Pulidindi, 2016).

Advanced India project and agriculture

Government's "Advanced India Project" venture propelled on the first July 2015 imagines enabling natives with e-access to tax payer driven organizations and work related administrations, among others. The venture has three centre segments, viz. advanced framework, computerized administrations and advanced proficiency. A cell phone is the favoured conveyance medium with centre around m-Governance and m-Services. The Agriculture and m-Gram Bazaar, out of the seven parts secured under m-Services, specifically affect farming augmentation and promoting administrations.

It tries to:

- Transform rustic India into a carefully enabled learning economy.
- Provide all-inclusive telephone availability and access to broadband in 250000 towns.
- Extend convenient administration to ranchers through data innovation and its devices.
- Enhance productivity in agrarian administration through computerized education and electronic conveyance of administrations.

Government initiatives

The government has come with new strategies and initiatives to help the farmers, among others, started a few measures. The Government has put in task three entrances viz. agriculturist gateway, Kisan call focus and the m-kisan entryway to enable ranchers to make educated choices for effective cultivating under differing agro-climatic conditions.

Kisan Credit Card (KCC):

The Kisan Credit Card scheme is a credit scheme introduced in August 1998 by Indian banks. This model scheme was prepared by the National Bank for Agriculture and Rural Development on the recommendations of R. V. GUPTA Committee to provide term loans and agricultural needs. Its objective is to meet the comprehensive credit requirements of the agricultural sector by giving financial support to farmers. Participating institutions include all commercial banks, Regional Rural Banks, and state cooperative banks. The scheme has short-term credit limits for crops and term loans. KCC credit holders are covered under personal accident insurance up to Rs. 50000 for death and permanent disability and up to 25000 for other risk. The premium is borne by both the bank and borrower in a 2:1 ratio. The validity period is five years, with an option to extend for up to three more years. Kisan Credit Card offering credit to the farmers in two types *viz*, cash credit and term credit for allied activities such as pump sets, land development, plantation and drip irrigations.

Under the e-Governance program, soil wellbeing card programming has been institutionalized and online programming created to give coordinated supplement administration suggestions utilizing soil test edit reaction strategy for eight states.

Under National e-Governance Plan in Agriculture, data is given to ranchers through numerous channels including Common Service Centres Internet Kiosks and SMS. Presently, 12 distinguished groups of administrations give data on climate; soil wellbeing; seeds, supplements, bugs; water system; crops, great horticultural practices, cultivate hardware; promoting foundation; cultivate product costs, entries, obtainment focuses; electronic affirmation to send out and import; dry season help and administration; domesticated animals, fisheries administration; preparing; observing usage and assessment of plans.

National Bank for Agriculture and Rural Development has likewise outlined agrarian gateways for ranchers.

Centred attention:

It is urgently necessary to focus a nationwide review on determining how well the private sector and legislative have established and implemented ICT initiatives to support horticulture. This evaluation should

take into account the following factors:

1. Number of ranchers routinely accepting and utilizing portable empowered horticultural data administrations.
2. Input from clients about substance, convenience, utility, fulfilment, changes required, their complaints.
3. Increment in efficiency, yield, and salary of profited agriculturists.
4. Increment in value acknowledgment in cultivating products sold, coordinate offering without reliance on agents.
5. Decrease in expenses of exchanges.
6. Mechanism to review complaints.

For the effective outlining in the areas of farming, the following framework has been introduced.

1. Straightforward entry
2. Refreshed substance
3. Format, outline and study subjects
4. Simple route
5. Higher intuitiveness
6. Access through numerous media
7. Higher utilization of non-printed data
8. Language alternatives
9. Lower cost of exchange

Robotics in agriculture:

The use of robotics in the field of agriculture is quickly becoming a thought-provoking high-tech industry, representing novel professionals, original companies and new investors. The technology is developing rapidly, not only advancing the fabrication capabilities of farmers, but also advancing robotics and mechanization expertise as we know it. In the farming sector, the multipart ranch duties are being too risky and they are performed by the robots, which are tricky for human to achieve. The news claims that the Japanese regime has taken a proposal to use automatic operators in domain inundated by the March 2011 tsunami. This "Dream project" was planned to involve unmanned tractors effective on the farm on the disaster site. The robotic farmers are capable of cultivating vegetables, fruits, soybeans, wheat and rice, which are then packed in boxes and shipped across the country by this robotic technology. Agricultural robots are rising production yields for farmers in assorted ethnicity. From drones to self-governing tractors to robotic arms, the technology is organism deployed in original and pioneering applications.

Agricultural robots mechanize purposeful, chronic and boring tasks for farmers, allowing them to spotlight further on civilizing overall production yields. Some of the most common robots in agriculture are used for harvesting and picking, weed control, independent mowing, pruning, seeding, spraying and lessening, arrangement and packing and effectiveness platforms. Harvesting and picking is one of the most popular robotic applications in agriculture due to the accurateness and rapidity that robots can attain to progress the size of yields and diminish ravage from crops being left in the field. For example, a robotic system designed to pick sweet peppers encounters many obstacles. Vision systems must conclude the spot and maturity of the inter leave in unkind conditions, including the occurrence of clean, varying light greatness, temperature swings and movement created by the wind. But it still takes more than advanced vision systems to pick a pepper. A robotic arm must navigate environments with just as many obstacles to delicately grasp and place an infuser. This process is very different from picking and placing a metal part on an assembly line. The agricultural robotic arm must be supple in a lively environment and perfectly adequate not to damage the peppers as they are being selected. Harvesting and substitute robots are attractive, very trendy with farmers, but there are dozens of other novel traditions the agricultural diligence is deploying present computerization to develop their production yields.

Need of administrative and development authority

1. Increment in ranchers' simple, convenient and dependable access to horticultural data framework all through the nation in an orderly and arranged way.

2. Advancement of need based suitable computerized models for agribusiness under open and private area which adjust BIS and accessible at moderate expense.
3. Enhancing general and advanced education and PC aptitude and computerized framework in provincial India in accordance with the computerized India vision and avoidance of receiver models and fake practices.

Advantages of digital India for agriculture

- Electronic or digitization activity can decrease battles for land, affirmation and exchange of land accordingly ranchers.
- Technology exchange, regardless of whether the figure will be quicker and simpler through advanced India.
- 'Seed Bank', 'Land overview' needs digitization, once done, then the government can frame approaches and can direct agriculturists to best practices reasonable to their property.
- Digitization can cull the escape clauses and increment proficiency in endowment and other advantage exchange.
- Online exchange of information will be a shelter once ranchers associated with it. This will incorporate them straightforwardly with the government where arrangements can be given rapidly.
- India is a major agrarian culture and no horticultural society can develop without coordinating the greater part of its populace since it is a gathering of individuals associated with determined social cooperation, or an extensive social gathering having the same geological or social domain, commonly subject to the same political expert and overwhelming social desires. These projects will incorporate the rancher network to a standard which was to a great extent due.

Conclusion

From the examination, we came to realize that e-farming administration gives advantages like to expand profitability, expanded quality in items, high pay, expanded productivity, raised profit, simple information assembling about climatic condition, dampness, soil type, crop design and so forth and can share agrarian information in a quick way. E-horticulture encourages auspicious and precise reports with respect to current market cost and the market request to ranchers at lower cost and at lower chance by methods for ICT empowered gadgets, for example, cell phones, radio, TV and through internet providers. Consequently, making mindfulness among the rustic masses with respect to IT and ITC programs, assumes the indispensable job or accomplishing rustic improvement. If IT and ITC mindfulness had been made among the provincial masses that may prompt social and financial prosperity of country masses that encourages rustic advancement just as country advancement. India is a making country so keeping cash region was totally electronic giving all trades and activities. These preferences moreover significant to the agriculturist that development an Indian Government has given to the farmer entrance, Kisan Call Centre, and the m-kisan portal to empower farmers to settle on taught decisions for profitable developments under evolving agro-climatic conditions. For making countries, the advances in enrolling power, accessibility, electronic thinking, biotechnology and GIS and more state-of-the-art, progressively equipped headways hold monstrous assurance.

References

Atanasoaie. 2017. Distribution channels on the organic foods market. *Journal of Horticulture, Forestry and Biotechnology.* **15 (3)**: 19-25.

Jasur, H. and Haliyana, K. 2015. The impact of website quality on online purchase intention of organic food in Malaysia: A webqual model approach. Elsevier.

Pradhan, K. P. and Mohapatra, V. 2019. E-agriculture: A golden opportunity for Indian farmers. *International Journal of Research and Development - A Management Review.* **4 (1)**: 2319–5479.

Varun, K., M. and Pulidindi, V. 2016. E-agriculture and rural development in Katpadi Taluk in Vellore District of Tamil Nadu. *Journal of Chemical and Pharmaceutical Sciences.* **9 (4)**: 96-101.

LP 2.4

Role of ICT in agricultural information dissemination and management

Ashok Kumar Sharma[1], Vinod Kumar[2] and P. K. Rai[3]

[1]Pr. Scientist (Ag. Extension), [2]Pr. Scientist (Comp. Appl), [3]Director

ICAR-Directorate of Rapeseed-Mustard Research, Bharatpur (Rajasthan), India

Corresponding author: ashok.drmr@gmail.com

Introduction

Agriculture plays a significant role for economic, social development and improved livelihoods in India. More than 80 per cent of the population depends upon agriculture and allied fields.Information of adequate quality is a necessary condition for improvement of all areas of agriculture [2]. It has been widely recognized that management and transfer of relevant knowledge plays an important role in agriculture growth and productivity.With the rapid development of Information and Communication Technologies (ICTs), data and information can be effectively generated, stored, analyzed, disseminated and used to support farmers and farming communities to improve agricultural productivity and sustainability. Information services for farmers at the national and regional level are a promising new field of research and application in the emerging field of e-agriculture.

Information and Communications Technology (ICT) in simple terms, can be defined as the basket of technologies, which assist or support in storage, processing of data, or information dissemination. ICT thus includes technologies such as desktop and laptop computers, software, peripherals and connection to the Internet that are intended to fulfill information processing and communication functions. ICTs are most natural allies to facilitate the outreach of Agricultural Extension system in the country. Despite large, well-educated, well-trained and well-organized Agricultural extension manpower, still a large number of farmers in the country remain un-reached, not served by any extension agency or functionary. Hence ICTs are highly relevant for Agricultural Extension scientists, researchers, functionaries and organizations.ICTs play also an important role in facilitating agricultural growth because they increase the efficiency of market interactions and provide access to real time information mainly by enhancing farmers' access to markets and their pricing power through the use of trading platforms over the Internet through web/mobile applications.

Potential of ICT in agriculture

Here the potential of ICT has been discussed in two way, one is information management and another one the effective dissemination.

Use of ICT in Information Management in Agriculture (IMA)

Right information, at right place and right time accessible to the farming community helps to improve production, productivity and brings higher income. Therefore, for sustainable development, agricultural sector must be backed up by modern agricultural information. In this context, IMA is an important in promoting sustainable livelihoods and reducing rural poverty.

The information management process in agriculture includes, the scientific information generated by the scientific community at research institutes, SAUs and farming community by their own traditional information generated over the period, consistent with the culture and socio-economic status. This huge scattered information must be integrated according to the specific domain of requirement. Development of user-friendly database applications and storage devices make it easy to store and retrieve. Information is stored in the repositories like various research publications; internetbased digital repositories, computer-based KIOSKs, audio video CDs, DVDs and so on. Some of the institutional digital repositories initiatives in Indian agriculture, like KRISHI@IASRI developed by Indian Agricultural Statistical Research Institute, Eprints@IARI, of Indian Agricultural Research Institute (IARI), ERepository@IIHR of Indian Institute of Horticultural Research (IIHR), Eprints@CMFRI developed by Central Marine Fisheries Research Institute (CMFRI), are contributing significantly in agricultural information management in India.

Use of ICT in Information Dissemination in Agriculture (IDA)

The potential of ICT in agricultural disseminationcan be used on two ways: Directly, where ICT is used as a

tool that contributes directly to productivity of agricultural production. Indirectly, where ICT is used as a tool that provides information to farmers for making quality decisions in efficient management of their enterprises.

Direct contribution of ICT to agricultural production - Precise farming which is based on intensive use of ICT and it contributes directly to agricultural productivity. In order to increase agricultural production, techniques of remote sensors with support of satellite technology, geographic information systems (GIS), agronomics and soil science are applied.ICT helps the farmers to track and monitor the weather conditions on a regular basis. Meteorological data and agro-advisory services enables farmers to watch current temperature, humidity conditions of the air and soil, rainfall, moisture of soil, length of the day, speed of the wind, solar radiation, amount of sunlight, etc.

Farmers can also use Artificial Intelligence (AI), new emerging technology in the field of agriculture. AI-enabled systems help to detect insects and plant diseases more quickly than humans. AI-powered system could detect an infestation of insect-pest on crops, and send the data back to the farmer's mobile phone, and then suggest what action should be taken next. Now a days AI-guided drone immensely helping to farmers in several ways such as monitoring of crop and spraying of insecticides and pesticides in efficiently and safe manner. All these technologies are required for precise farming and result in increased quality of the crop yield.However, presently all these techniques and technologies of precise farming require capital investments which are payable for big farms. Governmentsand private organizations are in process to make these technologies affordable to small farm holders.

Indirect contribution of ICT empowers farmers in decision-making and should be realized in the future development of agriculture. Changes in the agricultural environment that farmers face make the information useful and it becomes necessary for them to stay competitive and survive in globalized markets. Farmers need timely and reliable sources of information, presently, farmers depend on conventional sources of information that are unreliable and do not give timely information. ICT provides information on the market trends and prices which help the farmers to negotiate prices, protect their food security and livelihoods. ICT provides weather forecasts, crop-specific advisory according to the stage in the crop cycle, and price information which empowers the farmers and prepares them to gain maximum profit from the available resources. Internet based applications/ portals have been developed by India Meteorological Department (IMD)for weather forecasting and dissemination of agro-advisory. The IMD's Agrometeorological Advisory Service (AAS) collects and organizes weather, soil, and crop information. The AAS combines this information with weather forecasts to help farmers make the most efficient use of natural resources. The AAS is available in 550 districts. Farmers receive advisories before various stages of farming. The advisories are communicated to farmers on Tuesdays and Fridays through apps like mkisan, sachet, etc and websites/ portals Institute and KVK websites, WhatsApp, SMS, Facebook and other social media tools also.

ICT tools and technologies enable farmers to manage their supply chains and control production. ICT platforms assist in making better decisions regarding transportation and logistics, price and location, supply and demand, and cheaper access to inputs. The ICT platforms also facilitate financial transactions, capturing data about crop loss and damage assessment which would help in getting insurance claims for the farmers such as PM Fasal Beema Yojana

Besides these ICT technologies, using machine learning and artificial intelligence can help in the early detection of plant and crop diseases, the AI based user friendly applications have been developed by agricultural research institutes and universities on google play store and websites of respective institutes.

Some ICT tools (Apps / Portals/ Web based systems, Social media tools, etc)

The farmers can get all the knowledge that is required regarding marketing, sales, crop yield, weather conditions, etc. easily using these tools. It acts as a decision support system for the farmers thus aiding in proper decision making.

1. **e-NAM:** The National Agriculture Market called the eNAM is an online trading platform for agriculture and related products in India. It helps in better price discovery and provides enormous facilities for improving the existing market system. The products range from about 90 commodities including

vegetables, fruits, and staple food grains which are all available for trade. This platform basically provides uniformity among the agricultural market by making the procedures smoother. It removes any information that causes an imbalance between the buyers and the sellers and also enhances real-time price discovery that is based on the actual demand and supply which is helpful for both customers and farmers.

2. **Kisan Rath:** Mobile App Transportation plays a major role in the agricultural market. This app mainly helps the farmers and traders to identify suitable transport facilities for the movement of the farm produce and was launched during the current pandemic situation. The app facilitates a constant supply chain between farmers, inter and intrastate buyers, and traders. It also helps to reduce wastage and contributes to the better pricing of the products that are perishable. The app is developed by the National Informatics Centre (NIC) and helps the primary and secondary transportation of farmland and horticulture produce.
3. **RiceXpert:** This is a web-based application that was developed by ICAR-National Rice Research Institute (NRRI). It provides relevant information to the farmers regarding rice cultivation. Information regarding insects, pests, nutrients, weed, nematodes, and disease-related problems for various ecological zones. This application enables the smooth flow of information from the farmers to the farm scientist and the farmers can use this as a diagnostic tool in their rice fields and customize queries for the quick solution of their problems.
4. **mKisan:** mKisan SMS Portal for farmers enables all Central and State government organizations in agriculture and allied sectors to give information/services/advisories to farmers by SMS in their language, preference of agricultural practices and location..[6]
5. **KisanSuvidha:** This app was launched for the empowerment of farmers and the evolution of the village. It has a user-friendly interface and provides information on current weather, and also forecasts for the next few days, market prices of commodities-related agriculture in the nearest market, knowledge for fertilizers, seeds, machinery, etc. It is also available in many languages which makes it more accessible all over India especially in rural areas.
6. **PusaKrishi:** The app was launched by the Union Agriculture Minister of India in 2016 to help farmers to get information about technologies developed by IARI, which would help in increasing returns to farmers. The app also provides information related to new varieties of crops developed by ICAR, resource-conserving cultivation practices as well as farm machinery, and its implementation would help in increasing returns to farmers.
7. **Crop Insurance Mobile App:** This app helps the farmers to calculate the Insurance Premium for notified crops based on area, coverage amount and loan amount in case of loanee farmer. It can also be used to get details of normal sum insured, extended sum insured, premium details and subsidy information of any notified crop in any notified area
8. **Kisan Call Centres:** To harness the potential of ICT in Agriculture, Ministry of Agriculture launched the scheme "Kisan Call Centres (KCCs)" on January 21, 2004 aimed at answering farmers queries on a telephone call in farmers own dialect.
9. **Social media tools:** Social media plays a very important role in enhancing interactions and information flows among different actors involved in agricultural innovation and also enhance capacities of agricultural extension and advisory service providers. It helps to bridge a geographical distance between the farmers of different places. There are more than 100 Information and Communication Technologies (ICTs) based initiatives such as e-Choupal, e-aqua, Digital Green etc. which have been launched in India for the development of agriculture and rural development. As the social media use for agriculture sector and extension has gained momentum in the recent times, only popular platforms like Facebook, Twitter and YouTube are used for agriculture and extension related works. Social media may help farmers to improve their farming operations by giving information, education, entertainment, and awareness campaigns.

Conclusion

The information and knowledge are very vital in agricultural and plays a decisive role for the overall development of agriculture as well improving the livelihoods of farmers [4].Features and facilities of ICT have the potential to provide information necessary for sustainable development of agriculture.Integration of ICT, especially the use ofinternet, mobile phones,web based portals, Apps in extension is a potential disseminating channel which when effectively used, can create a significant impact. However, adoption of such technologies requires adequate capacity building for both extension staff and the end users (farmers).

Reference

Aayush Shrestha and Sathvik V (2021) Role and Potential of Information and Communication Technologies in Agriculture for Rural Development, International Journal of Engineering Research & Technology, 10 (11): 327-333.

Mao, Y. (2012) Meaning and Mode of Mobile Information Services (in Chinese). Information Science, 2012. 2.

Oyindeinbofa Nicholas-Ere (2017). Dissemination of Agricultural Information to Farmers using ICT, International Journal of Computer Applications, 179(7): 27-31.

Yun Zhang a , Lei Wang a, Yanqing Duan (2016) Agricultural information dissemination using ICTs: A review and analysis of information dissemination models in China, Information Processing In Agriculture 3: 17–29.

Daisy MbucuIreria, MzeeAwuora, James Ogaloa , David Nzukib (2021) Role Of Ict In The Dissemination And Access Of Agricultural Information By Smallholder Farmers In South Eastern Kenya, ActaInformatica Malaysia (AIM) 5(1): 31-34.

mKisan Portal (Access through : https://mkisan.gov.in/).

LP 2.5

Artificial Intelligence (Ai) in agriculture

Y. H. Rathwa, P. H. Vihariya and Keyur Gardhariya
Extension Education Institute, Anand, Gujarat
Email: yogeshrathva00@gmail.com

Introduction

"We're at beginning of a golden age of AI. Recent advancements have already led to invention that previously lived in the realm of science fiction - and we have only scratched the surface of what's possible"

– Jeff Bezos, Amazon CEO

Artificial intelligence (AI) is generally the intelligence shown by machines in doing particular task like humans or animals. AI have wide range of application in several fields of science and technology and one of the field in which it helps human is agriculture. AI is an emerging technology in the field of agriculture. AI-based equipment and machines, have taken today's agriculture system to a different level. This technology have enhanced crop production and improved real-time monitoring, harvesting, processing and marketing. The latest technologies of automated systems using agricultural robots and drones have made a tremendous contribution in the agro-based sector. Various hi-tech computer based systems are designed to determine various important parameters like weed detection, yield detection and crop quality and many other techniques. AI-based technologies are helpful to improve efficiency in all the fields and also manage the challenges faced by various industries including the various fields in the agricultural sector like the crop yield, irrigation, soil content sensing, crop- monitoring, weeding, and crop establishment. AI- based technological solutions have enabled the farmers to produce more output with less input and even improved the quality of output, also ensuring faster go-to- market for the yielded crops.

❖ **What is intelligence?**

- Intelligence can be defined as one's capacity for understanding, self-awareness, learning, emotional knowledge, planning, creativity and problem solving. Artificial Intelligence is intelligence in machine.
- it is commonly implemented in computer systems using program software
- Accordingly, there are two possibilities:
  1. A system with intelligence is expected to behave as intelligently as human.
  2. A system with intelligence is expected to behave in the best possible manner.

❖ **Artificial Intelligence (AI):** Artificial Intelligence (AI) is a field of computer science that emphasize on the creation of intelligent machines which can work and react like human.

❖ **History of Artificial Intelligence:**

1950 – The time when Artificial Intelligence came in existence.
1955 - John McCarthy Coined term '"artificial intelligence"
1974 - Computer became faster & affordable.
1980 - The year of artificial intelligence
2000 - Landmark of artificial intelligence (AI) establishment achieved.
After 2000 – Development phase initiated.

❖ **What makes human intelligent?**

1. Reasoning
2. Learning
3. Perception
4. Problem solving
5. Linguistic ability

❖ **Why Artificial Intelligence?**

- To understand human intelligence better. We test theories of human intelligence by writing programs which emulate it.
- To create useful "smart" programs able to do tasks that would normally require a human expert.

❖ **Major branches of AI:**

1. Robotics
2. Vision system
3. Natural Language Processing (NLP)
4. Machine learning
5. Artificial Neural Network (ANN)
6. Expert system

❖ **Types of AI:**

1. ANI (Artificial Narrow Intelligence): Specialized in one task.
2. AGI (Artificial General Intelligence): Smart as human in all aspect.
3. ASI (Artificial Super Intelligence): Smarter than human in all aspect.

❖ **Abilities of AI:**

1. **Computer vision**: How to recognize object?
2. **Speech and recognition & synthesis:** How to turn sounds into words and vice versa
3. **Natural language processing:** How to extract meaning from language and on the contrary convey meaning through generated sentences?
4. **Knowledge representation:** How to sort information in practical way?
5. **Reasoning:** How to combine pieces of information to reach conclusion?
6. **Planning:** How to schedule a sequence of actions to fulfill given goal and make sure they are well executed?

❖ **Use of Artificial Intelligence in different sectors:**

1. Education
2. Business
3. Medical science
4. Agriculture sector
5. Banking and Finance sector
6. Heavy industries
7. Transport

❖ **Why Artificial Intelligence in agriculture?**

- Agriculture is 5 trillion USD industry representing 10% of global spending, 40% of employment and 30% of GHG emission.
- The global population is set to reach 9.7 billion by the year 2050
- 2 billion more mouths to be fed within the next 30 years.
- Planting more crop in fields, or breeding more cattle is no longer an option.
- Farmers will be required to 'do more with less' and the option is greater efficiency within current farming methods.
- Ultra-precision' agriculture is on the horizon that manages field and inter-plant variation, neutralizes or minimizes impact of climate change.

❖ Uses of Artificial Intelligence in agriculture

1. **Smart irrigation**

- In agriculture, effective soil and irrigation management is paramount, influencing crop yield and quality.

Inadequate practices in these domains can lead to significant crop losses, necessitating the implementation of intelligent management systems to optimize productivity.

- The Smart Irrigation system, utilizing Internet of Things (IoT) technology, autonomously manages the irrigation process by analyzing soil moisture and climate conditions. Departing from labour-intensive methods, artificial intelligence becomes instrumental in leveraging historical weather data, soil quality insights, and crop specifics to enhance efficiency.
- Engineered to operate in real-time, automated irrigation systems employ machines to continuously monitor and regulate optimal soil conditions. This not only reduces the labour burden on farmers but also holds the potential to decrease production costs. Given that agriculture consumes a substantial 70% of the country's freshwater resources, integrating AI awareness stands as a promising avenue for water conservation in agricultural practices.

2. Monitoring crop and soil health

- Efficiently identifying potential defects and nutrient deficiencies in the soil is facilitated through the utilization of AI, whether in conducting or monitoring processes.
- Employing an image recognition approach, AI accurately detects defects using images captured by cameras. These AI-enabled applications play a crucial role in comprehending soil defects, identifying plant pests, recognizing plant stress, and diagnosing diseases.
- Leveraging remote sensing (RS) techniques, hyper-spectral imaging, and 3D laser scanning prove to be effective in constructing a comprehensive crop matrix spanning thousands of acres of cultivable land. There is a revolutionary shift as farmers embrace AI for monitoring farmland, offering significant advantages in terms of both time and effort.

3. Decrease pesticide usage

- Weed management benefits from advanced technologies like computer vision and machine learning, with AI aiding data collection for targeted chemical spray applications, reducing pesticide and herbicide losses. Weeds contribute to up to 90% of crop losses (Dhaliwal et al. 2015), and pests to 19% (Meena, 2015), leading to increased pesticide use and environmental risks. AI-driven agricultural bots offer efficient alternatives, mitigating overuse of pesticides, reducing environmental impact, and addressing labor challenges in traditional methods.
- Case Study: An objective oriented approach to frame a rule base was taken by Ghosh and Samanta (2003) in developing TEAPEST, an expert system for pest management in tea (Fig. 1).

Figure 1. Components of TEAPEST expert system

4. Image-based insight generation

- Precision farming stands out as a paramount domain in contemporary agriculture, leveraging advanced technologies for comprehensive field analysis, crop monitoring, and field scanning. Drones, equipped with image-capturing capabilities, play a pivotal role in these endeavours. The integration of computer

vision technology, the Internet of Things (IoT), and drone-generated data ensures the swift and informed decision-making processes by farmers. The application of image analysis in agriculture encompasses specific domains, including:

a. Crop Readiness Identification:

- Capturing images of diverse crops under white/UV-A light enables the determination of the ripening stage of crops/fruits. Farmers can categorize different levels of readiness based on the specific crop/fruit category.

b. Disease Detection:

- Crop diseases pose significant challenges to farmers, requiring expertise for timely detection and remedial actions. Computer-aided systems prove effective in diagnosing diseases and implementing control measures.
- A fuzzy logic-based model has been developed for disease forecasting based on leaf wetness duration. Image preprocessing involves segmenting the leaf image into distinct areas such as background, non-diseased parts, and diseased parts. The cropped diseased parts are subsequently transmitted to remote laboratories for further diagnostic analysis. Additionally, image processing techniques can be employed for pest identification and recognition of nutrient deficiencies.

c. Field management:

- Through the generation of a precise field map and the identification of regions necessitating water, fertilizer, or pesticide application, utilizing high-definition imagery obtained from airborne systems such as drones or copters, real-time estimations can be conducted throughout the cultivation period. This approach facilitates substantial resource optimization in agricultural practices.

5. Importance of drone and Unmanned Aerial Vehicle and agricultural robotics:

- Unmanned aerial vehicles (UAVs) serve as autonomous remote sensing platforms for image capture and data collection, providing a cost-effective means for extensive environmental monitoring.

Table 1: Uses and Implementation of AI Technology in Agriculture

AI	Uses	Implementation
● **Robots**	• Fruit picking • Driverless tractor • Shearing of sheeps • Weeding • Harvest automation	• A robotic system utilizes advanced mapping techniques to capture and process images, facilitating the identification and size-based harvesting of fruits. • Driverless tractors, classified as autonomous agricultural vehicles, excel in delivering substantial tractive force at low speeds, specifically designed for tasks like tillage in agriculture. • Robots featuring mechanical arms and precision trimmers, revolutionize the traditional practice of sheep shearing with advanced technological alternatives. • Specially designed wheels disrupt weed seeds during germination by disturbing the top soil layer, while a robotic system, reminiscent of a turtle, swiftly eliminates emerging weeds. • Robotic entities employ computer vision to detect and precisely locate fruits on trees, allowing for the identification and harvesting of fruits, even in the presence of shadows from adjacent fruits.

● **Drones**	• Soil and Field analysis • Crop Monitoring • Plantation • Livestock Management • Crop Spraying	• Crop surveillance is enhanced through the continuous monitoring capabilities of drones, providing valuable insights into crop development from seed sowing to harvest. • In plantations, drones offer eco-friendly solutions by saving fuel, reducing labour, and serving as alternatives to large tractors emitting harmful gases. • High-resolution infrared cameras on drone sensors enable swift detection of sick animals, contributing to effective livestock management. • Agro-drones streamline chemical spraying with reservoirs for fertilizers and pesticides, offering a time-saving and technologically advanced alternative to traditional methods.

6. Supply chain management

- Within the realm of agricultural supply chain management, Artificial Intelligence (AI) is poised to make substantial advancements. Its effective integration into supply chain planning and optimization, encompassing demand forecasting and logistics, holds the potential for significant cost savings for farmers. Furthermore, AI has the capability to address the information asymmetry problem among stakeholders in the agricultural supply chain.

7. Soil analysis and monitoring

- AI holds the potential to monitor soil health through the utilization of sensors, cameras, and infrared rays, conducting comprehensive scans of the soil to analyze its nutritional properties. This approach facilitates an in-depth understanding of the responses of specific seeds to diverse soil compositions, the influence of varying weather conditions on soil dynamics, and the likelihood of diseases and pests spreading.
- Employing AI for soil health monitoring not only proves highly efficient but also contributes to enhancing crop inputs, thereby resulting in substantial cost savings and increased productivity for farmers.

8. Precision agriculture

- Precision agriculture involves the use of technology to optimize crop production and reduce waste. AI can help farmers to make better decisions by analyzing data on soil quality, weather patterns, and crop yields. By using AI algorithms to analyze this data, farmers can identify areas of their fields that require more or less irrigation, fertilizer, or other inputs. This helps farmers to optimize their use of resources and reduce waste.
- One of the key benefits of precision agriculture is that it can help farmers to increase their yields while reducing their environmental impact. By using AI to optimize crop production, farmers can reduce the amount of water and fertilizer they use, and minimize the use of pesticides and other chemicals.

❖ **Can Indian agriculture be benefit from AI?**

- In agriculture, there is a great potential of AI machines to provide information to farmers on the quality of soil, when to sow, where to spray herbicide, and where to expect pest infestations. Thus, if AI systems can advise farmers on best practices, India could see a farming revolution.

❖ **Artificial Intelligence in India**

1. CROPIN - Using AI to Maximize per-Acre Value

- CropIn is a Bengaluru-based startup purporting to embody an intuitive, intelligent, and self-evolving system that provides forward-looking farming solutions to the agricultural sector.

2. Intello labs - Using Deep learning for image analysis

- Intello Labs, founded in May 2016 by IIT-Bombay alumnus Milan Sharma, specializes in advanced image recognition technology. This technology can identify a variety of objects, faces, flora, and fauna, tagging them within images.

- Small-scale farmers globally often rely on traditional methods due to limited access to scientific insights on crop lifecycles, pest management, quality metrics, and micro-fertilizer advancements.
- Intello Labs' image-based solutions, as per their website, provide valuable insights into crop health and assess final harvested quality through a simple photograph, addressing the knowledge gap for small-scale farmers.

3. Gramophone - Agstask technologies- Image recognition for soil science

- Situated in Madhya Pradesh, Gramophone asserts its utilization of image recognition in soil science to provide farmers with timely information, technology, and appropriate inputs aimed at enhancing agricultural yields.

4. Jivabhumi - The "Smart" Agriculture Marketplace

- Agricultural supply and demand often face a disconnect, with farmers struggling to find markets and consumers facing challenges in accessing safe, affordable food.
- Jivabhumi's 'Foodprint' is a solution addressing this gap, offering produce aggregation and food traceability. Leveraging technologies like blockchain, the system captures detailed information about produce at various stages in the supply chain.

5. Infosys (Precision Crop Management) - Using the Internet of Things (IoT) technologies

- Infosys has built a precision crop management testbed. This testbed will improve crop productivity through the analysis of highly granular, real-time sensor data from environmental sensors located in commercial crop fields.

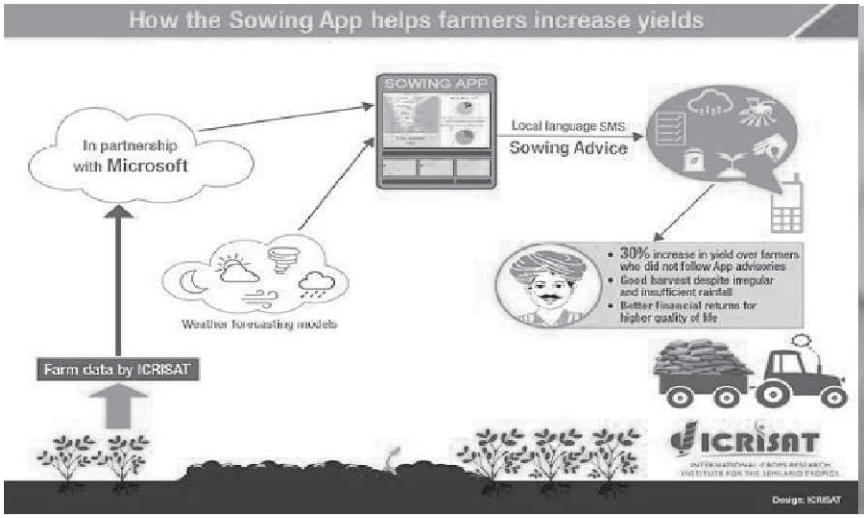
6. FASAL - Removing guess work from farming

- FASAL monitors micro and macro climatic conditions, soil parameters, solar conditions, crop stages, and growth characteristics. It continuously assesses soil moisture for precise irrigation matching crop needs, offering a 14-day micro-climatic forecast. FASAL also provides preventive advisories for disease and pest management, suggesting optimal sprays and timings. The platform simplifies farm planning, monitoring, and analysis in an intuitive manner.

❖ **Success Story of FASAL**

- Mr. Tallikotti mentions that the highlight of his experience with Fasal was real-time remote management of his farm during the Covid-19 lockdown. He lives 12 kms away from his farm and could not visit there for 2.5 months.
- Remote management of farm during Covid-19 lockdown.
- Saved Rs. 90,000 /- approximately in disease management
- 25 tonnes more yield as compared to previous season
- 60% less irrigation as compared to previous seasons

7. AI Sowing app.



- Microsoft partnered with the non-profit organization ICRISAT to create an AI-sowing app. Fueled by Microsoft's Cortana Intelligence Suite and Power Business Intelligence, the app utilizes advanced technology to convert data into actionable insights. It employs weather models and local crop yield data to provide accurate planting advice to farmers, enhancing precision in seed sowing decisions.

8. Price forecasting model

- In October 2017, Karnataka government and Microsoft signed an MoU to create smart farming solutions, focusing on an AI price forecasting model. Collaborating with the Karnataka Agricultural Price Commission, Microsoft integrated artificial intelligence, cloud machine learning, and satellite imaging to develop a sophisticated multi-variate commodity price forecasting model for the region.

❖ **Benefit of Artificial Intelligence**

- Less scope of errors
- Better decision making
- Can work in uninterrupted manner
- Handle complexities
- Optimum utilization of resources

❖ **Limitation of Artificial Intelligence**

- Incurs high cost
- Leads to unemployment
- No improvement with experience
- Lacks in creativity

❖ **Challenges in adoption of Artificial Intelligence**

- Availability of data
- Quality of data
- Return on investment
- Social acceptance

Conclusion

- Artificial intelligence has a wide range of applications in the field of science and technology including agriculture.
- There is a great potential of AI technology in agriculture for crop monitoring, soil health monitoring, irrigation management, weed detection, insect-pest management, weather forecast, etc. It can prove to be a boon for farmers to increase the yield and output of crops and animals and maximize profits in farms.
- Robots and machines are highly efficient and capable entities in carrying out multiple tasks within shorter time frame and thus can help to reduce drudgery of farmers and produce more from less with efficient use of resources.
- The future of farming largely depends on adoption of cognitive solutions. Large scale of research in AI is still in progress and some applications are already available at commercial scale. Thus potential use of AI can revolutionize Indian agriculture.

References

Ammulu, K. (2021). The impact of artificial intelligence in agriculture. *International Journal of Advanced Research in Science, Communication and Technology,* 1**(2)**: 193-197.

Dhaliwal, G. S.; Jindal. S, Mohindru, B. (2015). Crop Losses due to insect pests: Global and Indian Scenario. *Indian Journal of Entomology*, 77: 165-168.

Ghosh, I & Samanta, R. K. (2003). TEAPEST: An Expert System for Insect Pest Management in Tea. *Applied Engineering in Agriculture.* 19: 619–625.

Kaushal, S.; Kumar, S. and Tabrez, S. (2022). Artificial intelligence in agriculture. *International Journal of Science and Research,* 11**(5):** 1682 -1688.

Meena, R. (2015). A review of weed management in India: the need of new directions for sustainable agriculture. *The Bioscan*, 10: 253-263.

National Strategy for Artificial Intelligence. (2018). https://www.niti.gov.in/sites/default/files/2023-03/National-Strategy-for-Artificial-Intelligence.pdf

Saxena, A.; Suna, T. & Saha, D. (2020). Application of Artificial Intelligence in Indian Agriculture. https://www.researchgate.net/publication/341736064

LP 2.6

Drone technology in agricultural benefits and challenges for rural India

Sumit Salunkhe, K.A.Shah and Prabhu Nayaka
Krishi Vigyan Kendra, NAU, Navsari
Email: sumitsalunkhe@nau.in

Introduction

The drones are useful in multiple ways, such as, soil analysis for field planning, plant establishment, precision application of agrochemicals, crop monitoring, irrigation management, crop health assessment, livestock monitoring, and disaster management, geo-fencing, crop biomass and damage estimation, locust control, and transporting goods in agriculture. The paper also describes the initiatives of Government of India towards promoting drone technology. Challenges in use of the drone technology have been discussed. The study found that the application of drone technology saves time, labour, water, and cuts spending on chemicals. It also reduces use of chemicals and eliminates the chemical exposure to human. The paper concludes that the government should effectively adopt and leverage the potential of drone technology for transforming the agriculture sector and life of millions of farmers in India. Nowadays, researchers from different organizations including public research institutes and private companies are exploring different applications of drone technology ranging from tracking rhino poachers in dense forests, for searching and rescuing in disasters and natural calamities, and delivering medicine to remote areas during health emergency.

Benefits of drones in the agriculture sector

Drones can be used for a wide range of tasks in the agriculture sector, including crop mapping, soil analysis, irrigation, and pest management. Here are some of the key benefits of using drones in agriculture:

1. **Improved efficiency:** Drones can cover large areas of land quickly and efficiently, allowing farmers to gather data and monitor crops more effectively. This can help to identify issues early, leading to faster and more effective interventions.
2. **Enhanced crop yields:** Drones can be used to gather data on crop health, allowing farmers to identify areas that require attention. By addressing these issues, farmers can improve their crop yields and increase their profits.
3. **Reduced costs:** Drones can help to reduce costs by identifying areas of the farm that require attention, reducing the need for manual labour and reducing the use of pesticides and other chemicals.
4. **Improved accuracy:** Drones can capture high-resolution images and data, providing farmers with a detailed view of their crops. This can help to identify areas that require attention and ensure that interventions are targeted and effective.

Challenges of adopting drone technology in the agriculture sector

While drones offer many benefits to farmers, there are also some challenges that may be holding farmers back from adopting this technology. Here are some of the key challenges:

1. **Fear of job loss:** Many farmers are concerned that the adoption of drone technology will lead to job loss, as fewer workers will be needed to perform manual labour on the farm.
2. **Lack of knowledge and training:** Farmers may not have the knowledge or training necessary to operate drones effectively. This can make it difficult for them to adopt this technology, as they may not be confident in their ability to use it.
3. **Cost:** Drones can be expensive, and many farmers may not have the financial resources to invest in this technology.
4. **Regulatory barriers:** There may be regulatory barriers to the use of drones in agriculture, which could make it difficult for farmers to adopt this technology.

Is rural India afraid of losing jobs with the sole usage of drones or lack of training and proper knowledge holding the farmers back?

The adoption of drone technology in the agriculture sector in rural India is still in its early stages. While there is interest in this technology, there are also concerns about job loss and a lack of knowledge and training. However, there are efforts underway to address these challenges and encourage the adoption of drone technology.

One of the key initiatives is the Digital India campaign, which aims to provide digital infrastructure and connectivity to rural areas. This initiative includes a focus on training and education, which could help to address the lack of knowledge and training among farmers.

In addition, there are a number of organizations and initiatives that are focused on promoting the use of drone technology in agriculture. For example, the Indian Council of Agricultural Research (ICAR) has established a Centre for Precision and Farming Technologies, which is focused on promoting precision agriculture technologies, including drones.

Role of drones

- **Applications**- There are multiple uses for drones, including
  - Pesticide and nutrient application
  - Mapping water spread area
  - Sampling water
  - Mapping macrophyte infestation
  - Aquaculture management practices
- **Cost of application** - As per WEF, drone usage could reduce the cost of application by 20% and mitigate health hazards of manual work.
- **Precision agriculture** - It is also useful in promoting precision agriculture, thereby optimising input use.
- **Productivity** - Precision agriculture know-how and farm advisory services based on data sources can enable 15% increase in productivity.
- **Evidence-based planning** - Drones enable data collection and resource-efficient nutrient application which facilitates crop production forecast, and evidence-based planning.
- **Emerging technologies** - Drones can be an effective enabler for mainstreaming emerging technologies such as yield estimation or insurance.
- **Aid in government initiatives** - With drones, government initiatives like Per Drop More Crop will improve and water use inefficiency in irrigation will decline.
- Drones' data integrated with GIS and Google Earth satellite images will streamline schemes like PMFBY by aiding crop cutting experiments, crop-loss estimation, insurance determination and dispute resolution.
- **Agri-research** - With drones, agri-research will become highly customised and localised.
- **Better pricing** - Since drones can capture backward and forward linkages, food processing industries will procure from farmers at better prices

What steps were taken by the government to promote the use of drones?

- The agriculture ministry had released standard operating procedures (SOPs) for using drones in pesticide and nutrient application.
- Agriculture Ministry provides grant upto Rs. 10 lakhs to agricultural institutes for purchase of drones.
- Union Finance Minister has announced in the Budget 2022-23 that the Centre will promote 'Kisan Drones' to help farmers assess crops, digitise land records, spray insecticides and nutrients.
- The government has notified the Drone Rules 2021 which is expected to make drone operations simpler for civilian drone operators.
- New Delhi has eased drone policies with mechanisms such as the Production Linked Incentive scheme and import bans paving the way for the domestic manufacturing sector.

What is the need of the hour?

- The need is to scale up drone use in the agriculture sector from the present 10,000 aerial vehicles.
- Civil-military engagement should be promoted to realise gains from cross-industry application of drones.
- Consultations may be held with experienced strategic partners like **Israel** where AI-enabled drones are used for mapping plots, assessing crop damage, and even plucking only ripe apples.
- Farmer Producer Organisations (FPOs) and custom hiring centres should be encouraged to buy and loan them to the farmers for a nominal fee.
- As reported by ICAR, other challenges such as weather dependency of drones, improper internet connectivity across farms, unskilled end user, and potential for misuse, etc. should be addressed.
- India also needs a national level streamlining of production systems and production capacity, and rapid cycle manufacturing

Conclusion

Drones offer a range of benefits to farmers in the agriculture sector, including increased efficiency, improved yields, and reduced costs. However, there are also concerns about job loss and a lack of knowledge and training that may be holding farmers back from adopting this technology. While the adoption of drone technology in rural India is still in its early stages, there are efforts underway to address these challenges and promote the use of drones in agriculture. It is important for farmers to understand the potential benefits of this technology and to receive the necessary training and support to use it effectively.

In conclusion, the adoption of drone technology in the agriculture sector has the potential to transform the way that farmers manage their crops and improve their yields. While there are challenges to overcome, such as concerns about job loss and a lack of knowledge and training, there are also initiatives underway to promote the use of this technology and provide support to farmers who wish to adopt it. It is essential that farmers and policymakers work together to ensure that the benefits of drone technology in agriculture are realized, while also addressing any concerns or challenges that may arise. By doing so, we can help to create a more sustainable and productive agriculture sector that benefits both farmers and consumers alike.

References

The Hindu Businesslin | Drones: Giving farmers the wings to fly

Economic Times | Drones can boost India's GDP by up to 1.5%

Financial Express | Use of drones in agricultural sector

VISHAL KATEKAR* and JEEVAN KUMAR CHERUKU The Application of Drone Technology for Sustainable Agriculture in India, Current Agriculture Research Journal, ISSN: 2347-4688, Vol. 10, No.(3) 2022, pg. 352-365

LP 2.7

An insight into the use of Drones in Agriculture

P. C. Patel, S. A. Sipai and J. D. Desai
Assistant Professor, Directorate of Extension Education,
Anand Agricultural University, Anand - 388110

Prelude:

India's economy relies heavily on agriculture. The bulk of rural households still rely mostly on agriculture for their income. The agricultural products that make up the majority of India's exports are also very important to the country's economy. Agriculture is becoming more and more important, yet technical developments have not kept up with the industry. The main causes of this situation have been crop loss brought on by unfavourable weather and unmanaged pest problems. Indian farmers also still rely on the monsoon for irrigation and employ traditional techniques for other aspects of farming. As a result, despite farmers' unwavering efforts, the quantity and quality of agricultural produce are occasionally affected. Thankfully, there is yet hope. What if it is possible to predict crop failure ahead of time and take the appropriate action? Is it possible to combine conventional farming techniques with cutting-edge technology like Agri-drones to address the issues plaguing India's agricultural industry? Can drones play a significant role in agricultural observation, improving the likelihood of failure mitigation? Is yes, than one can able to resolve a bunch of issues related to the agriculture sector.

India's Agricultural Drone Sector

In India, the use of drone technology is growing, with a particular emphasis on the agriculture industry. Drones are useful for detecting pests and diseases, evaluating crop health, and managing fertilizer and irrigation more effectively. Acknowledging the technology's potential, the Indian government has launched initiatives to promote its utilization in several industries, including agriculture. Precision agriculture is a newer method that uses sensors and analytics to plant more effectively and rotate crops strategically. Creating computerized field maps, tracking crop conditions, forecasting yields, evaluating ploughing quality, and guaranteeing environmental compliance are all made possible by drones, which are essential to this process. Farmers may fine-tune inputs with the help of their high-resolution imaging and data collecting, which may boost yields, conserve resources, and improve agriculture's overall sustainability and profitability.

Many drone-based agricultural projects are undergoing in India. Consider the following real-life scenarios:

- On 26 January 2022, the Government of India has also released a certification scheme for agricultural drones, which can now carry a payload that does not include chemicals or other liquids used in spraying drones. Such liquids may be sprayed by following applicable rules and regulations.
- On 23 January 2022, to promote the use of drones for agricultural purposes and reduce the labour burden on the farmers, the government of India has recently offered, a 100% subsidy or 10 lakhs, whichever is less, up to March 2023 to the Farm Machinery Training and Testing Institutes, ICAR Institutes, *Krishi Vigyan Kendras* & State Agriculture Universities.
- Additionally, a contingency fund of Rs.6000/hectare will also be set up for hiring Drones from Custom Hiring Centres (CHC). The subsidy and the contingency funds will help the farmers to access and adopt this extensive technology at an inexpensive price.
- On 16 November 2020, the Indian government granted the International Crops Research Institute (ICRISAT), to use of drones for agricultural research activities. With this move, the government hopes to encourage budding researchers and entrepreneurs to look at budget-friendly drone solutions for more than 6.6 lakh Indian villages. *(https://tropogo.com/blogs/application-of-drones-in-agriculture-in-india)*

Global and India's Agricultural Drone Industry Market Size

The agricultural drone market is expected to increase at a compound annual growth rate (CAGR) of 21.2% between 2023-2032, from USD 1.7 billion in 2022 to USD 11.08 billion by 2032 (Market Us). Indian

Agriculture Drones market is forecast to witness a four-fold increase by 2028, with a projected CAGR of more than 25% during 2022 – 2028 (Blue wave). In 2020, the market for agricultural drones was estimated to be worth $0.88 billion globally (Wankhede). India's drone market is expected to expand by 7.55% between 2023-2028, reaching a US$34 million market size in that year (Drones).

Modernizing Agriculture in India

Farming is critical to global crop production and food supply. According to the "Agriculture in 2050 Project", the 7.9 billion world population is projected to increase by ~76 million per annum, and to increase by 28% to ~10 billion by 2050. Consequently, the global food demand will require a 60% boost in agricultural food production, from 8.4 billion tonnes to 13.5 billion tonnes by 2050 (Hunter *et al.,* 2017). The population is rising in India; it is currently 17.63% (1.375 billion) of the total world population and is predicted to increase to 1.7 billion (+23.6%) in 2050. India will surpass China, as the world's most populous nation by 2027 *(UN, 2019).* The growing food demand of the increased population will require an increase in agricultural production. If there is no change in policy, in order to keep pace with the demand, India's food grain production including pulses will require a 49.6% (457 million tonnes) increase by 2050 (Chand, 2012). This is a challenging task for India with a global natural resource base of only 2.4% land and 4% water. The climate crisis is expected to exacerbate this challenge that leads to increased crop failures, water insecurity, depletion of natural resources and more frequent and extreme weather events. Achieving rising food demand from an already seriously depleted natural resource base and climate change challenges will be impossible without profound changes in our agriculture food production systems (Rao, 2020).

By keeping the above facts in mind, there is a need of change in agriculture in terms of technological advancement and Drone is one of the technological intervention that may definitely be helpful in the future farming to mitigate the challenges in the farming.

Unmanned Aerial Vehicles (Drones)

An unmanned aerial vehicle (UAV), commonly known as a DRONE (Dynamic Remotely Operated Navigation Equipment), is an aircraft that can fly and stay airborne without a human pilot on board, able to perform critical farm operations without risking a human's safety, and operating more cost effectively than equivalent manned systems *(Sadraey, 2020).* According to National Institute of Standards & Technology, UAV is defined as an "Electro-mechanical system, with no human operator aboard, that is able to exert its power to perform designed missions" *(Huang, 2004).*

According to "UAV Aircraft System Rules 2021" in India the UAVs based on the maximum all-up weight including payload, are classified as

(i) Nano - less than or equal to 250 g;
(ii) Micro - greater than 250 g and less than or equal to 2 kg;
(iii) Small – greater than 2 kg and less than or equal to 25 kg;
(iv) Medium - greater than 25 kg and less than or equal to 150 kg; and
(v) Large - greater than 150 kg.

By the type of control, *(Pino, 2019)* has classified the UAVs as,

(i) Autonomous - UAV does not need a human pilot to control it from ground and it is guided by its own integrated sensors and systems.
(ii) Monitored - A human technician is needed to provide information and control the feedback of the UAV. The UAV directs its own flight plan and the technician can decide what action to take and this type is common in precision farming and photogrammetry work.
(iii) Supervised - It is piloted by an operator, although it can perform some tasks autonomously.
(iv) Pre-programmed - It follows a previously designed flight plan and there is no way to modify it to accommodate possible changes.
(v) Remotely controlled - It is piloted directly by a technician through a console.

Applications of Unmanned Aerial Vehicles in Agriculture

Drone technology can be used to improve long-term performance, enhance environmentally friendly land management, maximize crop yields, and conserve time. The following are some uses for drones in agriculture:

(A) Remote Sensing

- **Seedling emergence rate, measurement and mapping**
- **Measuring crop water status:** Visual wilting score (Peanut), Leaf water potential (Vineyard, Citrus), Stomatal conductance (Cotton, Peach, Vineyards, Nectarine, Olives, Black poplar), Stem water potential (Almond, Apricot, Peach, Citrus, Orange, Nectarine and Vineyard)
- **Measuring soil moisture stress:** Soil water potential (Apple), Irrigation data (Pomegranate) and Soil moisture (Cotton)
- **Monitoring the development and dynamics of tree growth and structural properties:** Tree height, Crown diameter, Crown volume etc.
- **Analysis of soil profiles, soil physical and hydraulic properties**: Soil mapping & soil sampling, soil pH, soil texture heterogeneity, soil organic carbon, infiltration rate etc.
- **Assessment of soil tillage quality parameters:** Cloudiness and surface roughness
- **Measurement of soil erosion and soil loss**
- **Hydrology:** surface river velocity & flow estimations, Flood monitoring, temperature of water bodies, water contamination, harmful algal blooms & eutrophication, surface water & groundwater interactions and groundwater table levels.
- **Estimation of soil salinity**
- **Predicting fruit harvesting time in crops**: Apples, strawberry
- **Yield prediction in agricultural and horticultural crops**: Crop stand/tree counting, age estimation, plant height, leaf area index, growth vigour, fruit number, fruit size, fruit weight, fruit load/yield, quality and biomass in maize, soybean, banana, rice, wheat, barley, cotton, forages, onion, potatoes, sorghum etc.
- **Estimation of lodging severity**
- **Detection of volatile compounds released from cattle or ethylene from ripened fruits**
- **Weed detection and mapping:** Weed identification & classification, infestation severity and weed control in crops (Maize, Wheat, Soybean, Barley, Sorghum, Sugarcane, Chilli, Onion, Vineyards).
- **Disease detection and quantification:** Classification of healthy and diseased plants, Disease severity in several crops *viz.,* Vineyard, Peanuts, Olives, Cotton, Radish, Tomato, Sugar beet, Potato, Wheat, Citrus, Pears, Sugar beet, Soybean, Banana, Watermelon and Rice.
- **Pest detection and quantification:** Pest density and damage severity estimation in crops *viz.,* Potato, Onion, Canola, Sorghum, Vineyard, Lettuce, Carrots, Pines and Oak.
- **Detection of rat holes**
- **Livestock applications:** Cattle scouting, tracking location, behaviour & movement, body temperature screening (heat stress) and cattle inventory; pasture status and signs of degradation
- **Aquaculture:** Site surveillance, underwater surveillance, cage detection, cage inspection, inspection of aquaculture net pens to identify holes or fouling of nets, Ship classification and detection, sea-weed habitat mapping, fish tracking and behaviour, water quality pollutants detection and assessment etc.
- **Forestry:** Assessments of wood lots, fires surveillance, vegetation monitoring, species identification, volume computation as well as silviculture can be accurately performed.
- **Wildlife:** Monitoring wildlife (detecting, counting, tracking and monitoring) and wildlife damage
- **Farm inventory:** Inspection of farm houses, plants and other infrastructure such as roads, pipes, drainage and electric lines (various sensors).
- **Biodiversity:** Assessment, protection and conservation.
- **Environmental biology:** Detecting, assessing and predicting threats on vegetation and behaviour studies of animals.
- **Aerobiological sampling of agricultural threat agents** (*e.g.*, plant and animal pathogens, and exotic insects).

- **Disaster management after extreme weather events:** e.g., hail storms, cyclones, tornadoes, fire, and floods.

(B) Physical Actions

- Pollination of crops
- Harvesting of fruits in apple and mango trees and vegetable crops
- Aerial spraying of herbicides for weed control
- Aerial spraying of fungicides in agricultural and horticultural crops for disease control
- Aerial spraying of pesticides in agricultural and horticultural crops for pest control
- Aerial spraying of fertilizers in agricultural and horticultural crops to supply nutrients
- Aerial spraying of defoliants in high density cotton for defoliation of leaves to facilitate mechanical harvesting
- Fertilizer granule spreader
- Release of biocontrol agents for biological control of pests
- Direct Seeding in field crops
- Planting in remote and inaccessible forest areas: Dropping biodegradable seed capsules for regeneration of forests and mangroves
- Removal of rainwater from tree canopies and fruit surfaces to prevent cracking
- Autonomous aerial water sampling from rivers and lakes
- *In-situ* water quality measurement: Temperature, electrical conductivity (EC), dissolved oxygen (DO), and pH of water
- Damage assessment and Protection of crops from wild animals including birds - "scarecrow"

(C) Marketing, Research & Media

- Marketing campaigns, photos and films for farms, machinery, *etc*.
- Making documentary films about agriculture and demonstrating research, fieldwork procedure, outdoor teaching *etc*. (Rao, 2022).

SWOT Analysis of the Drone/applications:

Strengths:

- Well-established market leaders with a significant presence across North America, Asia Pacific and Europe possess a robust brand image and offer an extensive array of products and services.
- The Indian agricultural drone market is anticipated to experience substantial expansion in the near future, propelled by government initiatives, a growing presence of industry stakeholders and an increasing need for food production.
- The use of drones in agriculture can provide farmers with valuable information about their soil, crop health, and irrigation issues, leading to improved crop yields and reduced costs with technological advancements in drone technology and precision agriculture.

Weaknesses:

- Newcomers might encounter obstacles when entering the market because of substantial capital prerequisites and the necessity for ongoing investments in research and development.
- The lack of skilled drone operators and the high cost of drones are also challenges in the agriculture drone market.
- The surge in drone-related government regulations globally.
- The agricultural drone market exhibits significant fragmentation, with numerous domestic, regional and global companies competing within the market.

Opportunities:

- Increasing demand for agricultural drones in India, driven by the necessity for enhanced agricultural productivity and crop well-being, may result in expanded production, consequently offering prospects for drone manufacturers.

- Waivers granted by federal agencies in the United States, India, and other nations within the agriculture industry offer promising prospects for the expansion of the agricultural drone market.
- The Indian government has been progressively relaxing regulations concerning drone utilization and actively encouraging start-ups to innovate and propose novel concepts.
- With the increasing prevalence of drone surveys, they are becoming more economical, thereby enhancing their affordability and accessibility to farmers.

Threats:

- The relatively significant need for initial capital and the essential ongoing investments in research and development might pose challenges for newcomers entering the market.
- The increasing focus on air traffic management and global regulations for commercial drones represents a substantial hurdle to their early adoption, which in turn impedes the market's growth.
- Fierce global competition alongside the existence of well-established companies in the market *(Singh, 2023).*

Challenges of using Drones in Agriculture:

a. **Initial investment:** The cost of purchasing and maintaining drones can be a significant upfront investment for farmers. However, the prices of drones have been decreasing over time, making them more accessible to a wider range of farmers.

b. **Operational costs:** Drones require batteries, sensors, and other equipment, which may need to be replaced or upgraded periodically. Additionally, there may be costs associated with training operators and complying with regulations.

c. **Specialized knowledge and skills:** Operating drones in agriculture requires expertise and training, which may not be readily available to all farmers. This can be a barrier to entry for some, as they need to invest time and resources in learning how to effectively use drones for their specific needs.

d. **Regulatory and legal constraints:** Drone operations are subject to various regulations and restrictions, which can vary by country and region. Obtaining the necessary permits and complying with these regulations can be time-consuming and complex. This can limit the widespread adoption of drone technology in agriculture.

e. **Flight endurance and battery life:** A primary constraint of drones is their flight duration, which is restricted by the energy supplied by batteries. This limitation can prove challenging when tasked with covering extensive regions or conducting prolonged flights for data-gathering objectives.

f. **Data management and analysis:** Drones have the capacity to produce substantial volumes of data, requiring processing and analysis to derive valuable insights. However, this process can become a bottleneck when farmers lack the essential tools or expertise to manage and decipher the data effectively.

g. **Costs and return on investment:** While drones can offer cost savings and efficiency improvements in the long run, the initial investment and ongoing maintenance costs can be a barrier for some farmers. The return on investment may vary depending on the specific application and the scale of the operation. *(Singh, 2023)*

Conclusion:

Drone technology is revolutionizing a number of industries, and its use in agriculture has enormous potential. Drones present a novel approach that can greatly increase industry production and cut down on resource waste. Nonetheless, there are certain difficulties with using drone technology in Indian agriculture. Drone technology has many benefits for agriculture, chief among them being its ability to perform a variety of tasks with an unprecedented level of efficiency. Data on crop health, soil conditions, and insect infestations can be obtained in real time using drones fitted with specific sensors. With the essential insights provided by this data, farmers are better equipped to make decisions that maximize resource allocation and production. Drone use can aid in reducing the waste of vital resources in a country where food security and resource scarcity are major problems. Drones may ensure that resources are used wisely, reducing environmental effect and enhancing the sustainability of agricultural methods, by accurately targeting areas that need

intervention, such water or fertilizers. It has enormous potential, but there are a number of obstacles preventing it from being widely used in Indian agriculture. For farmers with limited resources, the high upfront costs of drone purchases, along with the necessary infrastructure and training, provide significant obstacles. Furthermore, in order to establish a regulatory framework that protects citizens' privacy and safety while promoting responsible drone use, policy reforms are required. To maximize drone utilization in agricultural operations, more research and development work is needed. Drone operating procedures need to be adjusted, and technology needs to be verified and calibrated for the unique requirements of Indian agriculture. Furthermore, to guarantee the proper integration of drone technology, a thorough grasp of the possible effects on the environment and safety issues is necessary. For drone technology to be used effectively in agriculture, a number of other concerns need to be resolved and refined in addition to the challenges pertaining to cost and legislation. To sum up, drone technology has the power to completely transform Indian agriculture and make it more productive, sustainable, and efficient. However, realizing the full potential of drones in agriculture would require tackling the difficulties, carrying out in-depth study, and optimizing the technology for the particular requirements of the Indian agricultural terrain. To guarantee the widespread and appropriate implementation of drone technology in Indian agriculture, policymakers, researchers, and industry players must collaborate.

Reference

Blue Weave Consulting (2022). "India Agriculture Drones Market to Witness Four-Fold Increase by 2028". Global News Wire., https://www.blueweaveconsulting.com/press-release/india-agriculture-drones-market-to-witness-four-fold-increase-by-2028

Chand, R. (2012). Demand for foodgrains. Economic and Political Weekly, 42(52): 10–13.

Huang, H. M. (2004). Autonomy levels for unmanned systems (ALFUS) framework, National Institute of Standards and Technology Special Publication 1011, Volume I: Terminology, Version 1.1. September 2004.

Hunter M., Richard G. Smith, Meagan E. Schipanski, Lesley W. Atwood, David A. Mortensen (2017). Agriculture in 2050: Recalibrating Targets for Sustainable Intensification. Bio Science, 67 (4): 386–391.

Pino, E. (2019). Drones a tool for efficient agriculture: A high-tech future. IDESIA (CHILE) : 75-84

Rao, V. P.(2022) Smart Crop Monitoring and Agrochemical Application With Autonomous Drones. Professor jayshankar Telangana State Agricultural University, rajendranagar, Hyderabad, India.

Sadraey, M. H. (2020). Design of Unmanned Aerial Systems; John Wiley & Sons, Ltd.: Hobken, NJ, USA

Singh, P (2023). Drones in Indian agriculture trends, challenges, and policy implications. Indian Chamber of Food and Agriculture.

UN, (2019). World population prospects. Department of Economic and Social Affairs, Population Dynamics. https://population.un.org/

Wankhede, Sachin; Jangra, Himanshu (2021). "Agriculture Drones Market by Offering (Fixed Wing, Rotary Wing, and Hybrid Wing), Component (Cameras, Batteries, Navigation Systems, and Others), and Application (Precision Agriculture, Livestock Monitoring, Smart Greenhouse, Irrigation, and Precision Fish Farming): Opportunity Analysis and Industry Forecast, 2021-2030." Allied Market Research. https://www.alliedmarketresearch.com/agricultural-drone-market.

Websites:

https://tropogo.com/blogs/application-of-drones-in-agriculture-in-india

Drones – India. Statista Market Forecast. https://www.statista.com/outlook/cmo/consumer-electronics/drones/india.

Market .Us. "Agricultural Drones Market Is Anticipated to Surpass a Market Value of US$ 11.08 Billion by the End of 2032." GlobeNewswire, 2023, https://tinyurl.com/2wzvv3zp

LP 3.1

Sustainable rural development: A holistic approach

B. N. Kalsariya, V. J. Savaliya and P. B. Raviya
Department of Agricultural Extension Education
College of Agriculture, JAU, Junagadh

Introduction

Rural development is the process of improving the quality of life and economic well-being of people living in rural areas. The Sustainable Rural Development can be aimed through the holistic approach. This approach to rural development is a comprehensive approach that considers all aspects of rural life. It aims to create a rural landscape that is prosperous, adjusted, and resilient to the challenges of climate change and other global trends with consideration resources available with rural people and rural area as a whole. The rural development plans also considers the possibilities of various supports in form of financial assistance, advisory and administrative aspects from government, co-operatives, NGOs and private sectors.

The major focus on holistic way for rural development requires the consideration of the economic development, environmental conservation and social well-being. The economic development includes agriculture, horticulture and forestry, as well as developing new economic sectors such as tourism, renewable energy, processing, post-harvest technology and value-added agriculture. The environmental protection includes promoting sustainable land management practices, reducing pollution, and conserving biodiversity. The social well-being can be through investing in form of participatory mode and financial support for education, healthcare, and social services, as well as promoting cultural heritage and community participation. Thus, a holistic approach as a broad and integrated strategy for rural development is essential for building a more sustainable future for rural communities.

A. Economic Development:

1. Agricultural Development: The adoption of new technologies and improved agricultural practices is necessary to increases agricultural production and productivity on sustainable basis. It requires communication of improved practices through mass, group and individual communication methods as per the types of technologies and the behaviour of farmers. The latest agricultural technologies which have been proven beneficial should be transferred to the remote corners of rural areas through proper agricultural extension strategies. These methods can be print media, result and method demonstrations, exhibitions, agricultural fairs, social media including whattsapps, blogs, text messages, radio and television programmes, group meeting, training and workshop. These technologies are beings developed by agricultural research institutions periodically as per needs of the farmers, market, with consideration of weather specifically climate change conditions. These practices includes :

(1) Integrated Farming Approach: This is an approach to agriculture that combines different farming practices to improve productivity, sustainability and adaptability to climate change. It can be used to integrate agricultural and horticultural production, dairy farming, aquaculture, bee-keeping and forestry.

a) Benefits of integrated farming :

Integrated farming can have a number of benefits, including:

- Increased productivity: Integrated farming can help to generate employment throughout the year and increase income from farm productivity and dairy farming as interdependent.
- Improved sustainability: Integrated farming can help to promote ecological balance as well as to reduce soil erosion and water pollution.
- Adaptability to climate change: Integrated farming can help rural people to adapt to the effects of climate change, *i.e.* heavy rains, droughts, long dry spells and floods.

b) Practices of integrated farming :

There are many different practices that can be used in integrated farming. Some of the most common practices include:

- Crop rotation: This involves rotating different crops in the same field each year. This helps to keep the soil healthy and prevent the build-up of pests and diseases.
- Relay cropping: This involves planting of relay crops, such as legumes, in between rows of crops. Relay crops help to improve soil health by fixing nitrogen and adapting to less irrigation water availability for more returns from farm income.
- Intercropping: This involves planting two or more crops together in the same field. This can help to improve the productivity of the land and reduce the risk of pests and diseases.
- Dairy farmers: This involves integrating livestock, such as cows and chickens, with crop production. Livestock can help to improve soil fertility and control pests and at the same time, sufficient green and dry fodder can be made available to dairy animals.

(2) Precision farming: This involves using practices and technology to collect and analyze data about groundwater, soil, crops, and weather to make more informed decisions about farming practices. This leads to increased yields, reduced input costs, and improved environmental sustainability. The drones can be used to survey fields and collect data on crop health, including deficiency of nutrients, pest and diseases, soil moisture, and weed infestation. This data can then be used to create detailed maps that farmers can use to make better decisions about irrigation, fertilization, and pest control.

Benefits of Precision farming

Precision farming would be useful for a number of benefits including:

- **Increased yields:** The yields of crops can be increased by application of the right amount of water, fertilizer and pesticides at proper time to each part of a field.
- **Reduced input costs:** The input costs can be reduced by analyzing the collected data and using the inputs more precisely. Thus, it can help to reduce the cost of irrigation water, fertilizers and pesticides using at proper amount and at right time. This is also reduce the environmental impact of agriculture.
- **Improved environmental sustainability:** By reducing the use of water, fertilizer, and pesticides, precision farming can help to improve the environmental sustainability of agriculture.

Precision farming is still in its early stages of development in India, but it has the potential to revolutionize the way that agriculture is practiced in the country. There are a number of government and private initiatives underway to promote the adoption of precision farming in India.

One example of a precision farming initiative in India is the **National Agriculture Innovation Project (NAIP)**. The NAIP is a government-funded program that provides financial assistance to farmers who adopt precision farming technologies. The program has helped to train thousands of farmers in precision farming techniques and has provided them with the equipment they need to adopt these techniques.

Another example of a precision farming initiative in India is the **Precision Farming for Smart Agriculture (PFSA)** project. The PFSA project is a private-sector initiative that is working to develop and deploy precision farming technologies in India. The project has developed a number of precision farming tools and services, such as a mobile app that helps farmers to manage their crops.

Precision farming is a promising technology that has the potential to improve the productivity, profitability, and sustainability of agriculture in India. With the right support, precision farming can help to transform Indian agriculture and make it more competitive in the global market.

These are some examples of how precision farming is being used in India:

- **Drones are being used to survey fields and collect data on crop health, soil moisture, and weed infestation.** This data can then be used to create detailed maps that farmers can use to make better decisions about irrigation, fertilization, and pest control.

- **Remote sensing technology is being used to monitor crop growth and development.** This technology can help farmers to identify problems early on and take corrective action.
- **Variable rate technology is being used to apply inputs, such as water and fertilizer, at different rates across a field.** This helps to ensure that each part of the field receives the amount of input that it needs.

(3) Water conservation: This includes technologies such as drip irrigation, rainwater harvesting, and water storage tanks. These technologies can help to reduce water scarcity and improve crop yields. For example, drip irrigation delivers water directly to the roots of plants, which can help to save water and reduce evaporation. Rainwater harvesting collects rainwater from fields, barren lands through small ponds, farm ponds, bore and well recharging and other surfaces and stores it for later use. Water storage tanks can be used to store water during the rainy season for use during the dry season.

(4) Organic farming: This involves using natural fertilizers and pesticides to improve soil health and reduce environmental pollution. Organic farming can also help to improve the quality of food. For example, farmers can use compost made from crop residues and animal manure as a natural fertilizer. They can also use botanical pesticides made from plants to control pests.

(5) Non-farm income opportunities

- **Microfinance:** This provides small loans to rural entrepreneurs to start or expand businesses. Microfinance can help to create jobs and reduce poverty. For example, a microfinance institution might provide a loan to a rural woman to start a small business selling vegetables. This loan could help the woman to generate income and improve her family's standard of living.
- **Skill development:** This provides training to rural residents in a variety of skills, such as computer literacy, entrepreneurship, and technical skills. Skill development can help rural residents to find better-paying jobs. For example, a government program might offer training courses in computer programming or solar panel installation to rural youth. This training could help the youth to find jobs in the IT or renewable energy sectors.
- **E-commerce:** This allows rural residents to sell their products and services online. E-commerce can help to expand market access for rural businesses and improve their incomes. For example, a farmer might sell his produce online through a platform like Amazon or Flipkart. This would allow him to reach a wider audience and get a better price for his products.

(6) Infrastructure development

- **Roads:** Improved roads can help to connect rural areas to markets and other services. This can help to improve economic opportunities and reduce poverty. For example, a new road might connect a rural village to a nearby town, making it easier for villagers to get to market and access essential services.
- **Electricity:** Access to electricity can help rural residents to improve their quality of life by powering lights, fans, and appliances. Electricity can also be used to run irrigation pumps and other agricultural machinery. For example, a solar power plant might be installed in a rural community, providing electricity to homes and businesses. This would improve the quality of life for residents and make it easier for them to run their businesses.
- **Telephone and internet access:** This can help rural residents to stay connected with the outside world and access information and services. For example, a community center might be set up with computers and internet access, providing residents with a place to learn new skills and access information.

These are just a few of the technologies and practices that can be used to promote sustainable rural livelihoods in India. The best approach will vary depending on the specific needs and constraints of each community.

(7) Renewable energy and energy efficiency: This can help to reduce rural communities' reliance on fossil fuels and improve energy security.

Renewable energy technologies can help to address these challenges by providing rural communities with access to clean, affordable, and reliable energy. Solar, wind, biomass, and small hydropower technologies can be used to generate electricity for homes, businesses, and schools in rural areas. Renewable energy can also be used to power agricultural operations and other rural industries.

Energy efficiency measures can help to reduce rural energy consumption and costs. This can be achieved through a variety of means, such as improving insulation in homes and buildings, using energy-efficient appliances and lighting, and switching to renewable energy sources.

(8) Supporting sustainable forestry practices:

Supporting sustainable forestry practices is crucial for the well-being of our planet and future generations. Sustainable forestry involves managing forests in a way that balances ecological, social, and economic aspects. This practice ensures the long-term health of forests, promotes biodiversity, and reduces deforestation.

By supporting sustainable forestry, we contribute to combating climate change. Forests act as carbon sinks, absorbing carbon dioxide from the atmosphere and storing it in trees and soil. They also help maintain water cycles, prevent soil erosion, and provide habitat for countless species.

Sustainable forestry practices also benefit local communities, as they promote responsible harvesting, create job opportunities, and support the development of forest-based industries. Additionally, sustainable forestry can foster eco-tourism, promoting the appreciation and preservation of natural landscapes.

Supporting sustainable forestry practices not only benefits our environment but also creates job opportunities in rural areas. By promoting responsible harvesting and managing forests in a sustainable manner, more employment opportunities are generated in forestry-related activities such as tree planting, forest management, and timber production.

Sustainable forestry practices require skilled workers who specialize in forest management, wildlife conservation, and ecological restoration. These jobs provide livelihoods for local communities and reduce unemployment rates in rural areas. Moreover, sustainable forestry supports the development of forest-based industries, such as wood processing and manufacturing, which further contribute to job creation.

By investing in sustainable forestry practices, we can revitalize rural economies, empower local communities, and promote sustainable development while preserving our precious forest resources.

(9) Promoting sustainable tourism: This can help to generate income for rural communities while also protecting natural and cultural heritage.

India is a country with a rich and diverse rural heritage. Rural tourism in India offers tourists the opportunity to experience the unique culture, traditions, and natural beauty of the Indian countryside. It also provides a means of generating income for rural communities and promoting sustainable development.

There are some specific examples of how rural tourism can be used to generate income for rural communities and protect natural and cultural heritage in India:

- **Homestays:** Homestays offer tourists the opportunity to stay in a traditional Indian village home and experience the local lifestyle. Homestays can provide a significant source of income for rural families.
- **Ecotourism:** Ecotourism is a type of tourism that focuses on responsible travel to natural areas. Ecotourism activities in India can include trekking, camping, birdwatching, and wildlife safaris. Ecotourism can help to generate income for rural communities while also promoting conservation of natural resources.
- **Cultural tourism:** Cultural tourism is a type of tourism that focuses on experiencing the culture and heritage of a particular place. Cultural tourism activities in India can include visiting temples, mosques,

forts, and museums. Cultural tourism can help to generate income for rural communities while also promoting the preservation of cultural heritage.

(10) Developing social safety nets: This can help to ensure that all rural residents have access to basic necessities such as food, shelter, and healthcare.

Developing social safety nets in the Indian context is essential for creating a more sustainable livelihood. India has a large population living in poverty, and social safety nets can help to reduce poverty and inequality, protect people from economic shocks, and make them more resilient to challenges such as climate change and natural disasters.

In addition to the above, holistic approaches to rural development often emphasize the following:

- **Community participation**: Holistic approaches to rural development recognize that local communities are best placed to identify their own needs and priorities. Therefore, community participation is essential to the success of any holistic development initiative.
- **Sustainability**: Holistic approaches to rural development aim to create systems that are sustainable over the long term. This means considering the environmental, social, and economic impacts of development decisions.
- **Equity**: Holistic approaches to rural development aim to create a more equitable society, where all people have the opportunity to thrive. This means addressing the needs of all rural residents, including women, youth, and marginalized groups.

LP 3.2

Impact of climate change on agriculture and climate smart agricultural practices

C. K. Patel[1] and D. B. Patel[2]

[1] Associate Director of Research, S. D. Agricultural University, Sardarkrushinagar-385506

[2] Associate Director of Extension, S. D. Agricultural University, Sardarkrushinagar-385506

Climate change

Any change in climatic variables over time, including temperature, precipitation, atmospheric gases, solar radiation, etc., whether due to natural variability or as a result of human activity, is referred to as climate change.

- Changes in climate can be expected to have significant impacts on crop yields through changes in temperature and water availability.
- Climate change could affect different parts of the world in different ways.
- Climate change can have a positive or negative impact on crop yields, as well as the kinds of crops that can be grown in particular regions, by affecting agricultural inputs like irrigation water and solar radiation that affect plant growth, as well as weed, insect, and disease infestation.
- It is certain that the future climate change will further impact agricultural production, which is mainly negative and will directly threaten India's food security.
- India is a vast country covering 3.28 million km^2, occupying only 2.4 per cent of the world's geographical area but supporting 16.2 per cent of the global human population.
- More than 60% of its population is dependent on climate sensitive activities such as agriculture.
- Temperature increases

  Observed: 0.4°C over past 100 years.

  Projected: ~ 2 °C by 2050.
- Precipitation will be more variable, e.g. changes in monsoon patterns
- Increase in both intensity & frequency of extreme events:

  Droughts, Floods, Cyclones
- The impact of climate change and global warming is now recognized worldwide.

Disasters - Indian Scenario India supports $1/6^{th}$ of world's population on 2 % of world's landmass

- 59% of land vulnerable to earthquakes
- 68% of cultivable lands are vulnerable to droughts
- 40 million hectares (12%) of land vulnerable to floods
- 80% of coast vulnerable to Cyclones
- 1 million houses damaged annually leading to human, economic, social and other losses

Floods

- About 30 million people are affected annually. Floods in the Indo - Gangetic - Brahmaputra plains are an annual feature.
- On an average, a few hundred lives are lost, millions are rendered homeless and several hectares of crops are damaged every year.
- Nearly 75% of the total rainfall occurs over a short monsoon season (June - September). 40 million hectares, or 12% of Indian land, is considered prone to floods.
- Floods are a perennial phenomenon in at least 5 states - Assam, Bihar, Orissa, Uttar Pradesh and West Bengal.

Cyclones

- About 8% of the land is vulnerable to cyclones of which coastal areas experience two or three tropical cyclones of varying intensity each year.

- Cyclonic activities on the east coast are more severe than on the west coast.
- The Indian continent is considered to be the worst cyclone-affected part of the world, as a result of low-depth Ocean-bed topography and coastal configuration.
- The principal threat from a cyclone is in the form of gales and strong winds; torrential rain and high tidal waves and storm surges. More cyclones occur in the Bay of Bengal than in the Arabian Sea and the ratio is approximately 4:1.

Droughts : Drought is another recurrent phenomenon which results in widespread adverse impact on vulnerable people's livelihoods and young children's nutrition status. About 50 million people are affected annually by drought. Of approximately 90 million hectares of rain-fed areas, about 40 million hectares are affected by scanty or no rain though droughts are slow onset emergency, and to an extent predictable emergency, they have caused severe suffering in the affected areas exacerbating poverty, hunger and unemployment

Inter-governmental Panel on Climate Change (IPCC)

- IPCC is the international body for assessing the science related to climate change. It was set up in 1988 by World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks and options for adaptation and mitigation.
- IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they underlie negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC).
- The IPCC embodies a unique opportunity to provide rigorous and balanced scientific information to decision-makers because of its scientific and intergovernmental nature. Participation in the IPCC is open to all member countries (195) of the WMO and United Nations.
- IPCC assessments are written by hundreds of leading scientists who volunteer their time and expertise as Coordinating Lead Authors and Lead Authors of the reports.
- National Innovations in Climate Resilient Agriculture

Rainfall Trend

- More than seasonal rainfall, the distribution is more important for dryland crops grown during kharif.
- Long dry spells have significant negative impact on fodder and grain production indirectly affecting the livestock production.
- Extreme events such as cold waves, heat waves, floods and high intensity single day rainfall events are on increasing trend during the last decade.

Temperature Trend

- Temperature is another important weather variable which affects crops.
- Last three decades saw a sharp rise in all India mean annual temperature.
- Though most dry land crops tolerate high temperatures, rainfed crops grown during rabi are vulnerable to changes in minimum temperatures.
- The extent to which rainfall and temperature patterns and the intensity of extreme weather events will be altered by climate change remains uncertain, although there is growing evidence that future climate change is likely to increase the temporal and spatial variability of temperature and precipitation in many regions (IPCC, 2007).

For example;

- Drought across the country during kharif-2002 and prolonged dry spell during July-2004, drought in North-East in 2006, country wide drought during 2009.
- The heat wave in AP during May-2003.
- Extreme cold in North during 2002-03 and in Raj. during 2005-06.
- Floods during 2005, unusual floods in Rajasthan desert and North Gujarat in 2006, at AP & Karnataka in

2009, unusual flood in North Gujarat during 2015 and 2017.

- Abnormal temperatures during January-February, 2007 in North are some extreme weather events which had significantly impacted agriculture.

Contribution of Agriculture in Mitigating Climate Change

The sustainable ways of agriculture through which we could mitigate climate change.

- Organic Agriculture
- Development of Resource Conserving Technologies
- Multiple-cropping or Inter-cropping
- Agro-forestry
- Carbon Sequestration
- Localization of food
- Livestock Management
- Soil Management
- Afforestation and promotion to wetlands
- Rainwater management
- Energy management
- Nutrient management

1. Soil Resource:

Soil is the stomach of the plant, said Aristotle. Essentially all life depends on soils. There can be no life without soil and no soil without life; they have mutually evolved together. Agricultural production is largely dependent on soil's productivity.

The technology with the current trends in precipitation may be able to protect the surface soil such as

1. No-till / minimum till which helps in;
2. Minimum soil disturbance
3. Minimum traffic for agricultural operations
4. Leave and manage crop residues
5. Adopt temporal and spatial crop sequence/rotation to maximize benefits from inputs
6. Minimize adverse environmental impacts
7. Enhance the productivity
8. No-till reduces erosion levels

Increase of Soil Organic Matter

- Create drought resistant soil, thereby increases soil moisture, increases soil porosity for sustained food production
- Reduce soil erosion, and runoff
- Reduce water logging
- Increase yields
- Reduce use of external inputs
- Increases biodiversity
- Provides resilience
- Improves biogeochemical cycles of nutrients
- Reduce input costs

2. Water resource:

- Look at water as a finite, fragile, scarce high economic value resource Adopt micro-irrigation
- Huge potential for supplemental irrigation lies in rainfed ecosystems

Improve WUE

For rainfed agriculture

i. Conserve on farms
ii. Provide supplemental irrigation
iii. Adopt water harvesting
iv. Alternate crops

Adopt watershed approach

Better crop husbandry

Rain Water Harvesting: A technique of evading climate change effect

A. In-situ water harvesting:

(i) Compartmental bunding:

(ii) Ridge & Furrow:

B. Ex-situ water harvesting:

(i) Farm Ponds:

Downstream Impacts of Upstream Water Harvesting

(ii) Recharging of open well: Supplemental irrigation

3. Better crop husbandry practices:

The average water productivity with us is only 0.34 kg/m^3 as against 0.75 with China. For crop production, the water needs would double from 600 km^3 to 1200 km^3 if yield increases cannot be achieved to meet the growing population by 2025.

4. Strategies for Developing Climate Ready Crop Varieties:

In India impact of 1-2°C increase in mean air temperature is expected to decrease rice yield by about 0.75 t/ha in efficient zones and 0.06 t/ha in coastal regions and impact of 0.5°C increase in winter temperature is projected to reduce wheat yields by 0.45 t/ha (Aggarwal 2008).

5. Contingency crop planning:

1. Water management:
2. Crop-row management:
3. Nutrient management:
4. Selection of crop variety:
5. In-season drought management:
6. Choice of crops with changing sowing condition:
7. Supplemental irrigation:

6. Integrated Farming System:

Farming system approach is one of the approaches to deal with climate change in agriculture and to attain sustainability in production and to maintain soil health.

7. Agroforestry:

Trees on farms help adaptation to climate change by reducing vulnerability to climate impacts. Trees on farms can diminish the effects of weather extremes such as high temperatures and droughts.

The trees as components of landscapes also provides essential requirements of the communities such as fodder, fuel wood and other wood requirements for the rural communities.

a. Improvement in Microclimate
b. Enhancement of Soil Fertility
c. Stability in income through diversification

8. Foliar Nutrition of Crops:

Occurrence of frequent dry spells leads to low soil moisture under rainfed conditions, even fertilizer application at right time and right quantity may not be efficient due to insufficient soil moisture. When

availability of moisture becomes scarce, fertilizer's application through foliar spray leads to efficient absorption. Though foliar spray is not a substitute to soil application it can certainly be considered as a supplement to soil application.

9. Organic Farming and Climate Change:

Agriculture is a major contributor to emissions of methane (CH4), nitrous oxide (N,0), and carbon dioxide (CO:). According to the Inter-governmental Panel on Climate Change (IPCC) agriculture accounts for 10-12% of global greenhouse gas (GHG) emissions and this figure is expected to rise further.

10. Fodder Management:

I. **High Mitigation Potential:** Second-generation biofuels, conservation tillage/residue management, integrated soil fertility management, improved seed, low-energy irrigation.

II. **Low Mitigation Potential:** Overgrazing, soil nutrient mining, bare fallow, groundwater pumping and mechanized farming.

III. **High Food Security Prospects:** Second-generation biofuels, conservation tillage/residue management, overgrazing, soil nutrient mining & bare fallow.

IV. **Low Food Security Prospects:** Integrated soil fertility management, improved seed, low-energy irrigation, conservation tillage/residue management, improved fallow, groundwater pumping and mechanized farming.

11. Mechanization Strategies for Climate Resilient Agriculture:

- Need for suitable machinery for soil protection and in-situ rain water harvesting to mitigate the effect of climate change
- Conservation agriculture through the appropriate machinery to reduce the GHG emissions and for precision agriculture operation.
- Timeliness of all agricultural operation for easy crop management with resource conservation.

Appropriate machinery for making the famer more resilient for climate change:

- Tillage equipment: Primary tillage implements such as M.B. plough & Disc plough
- Bed-furrow formers:
- Rotavator and residue incorporation implement:
- Sowing equipment for intercropping in Agroforestry model
- Tractor drawn 6- row planter
- No-till, Strip till drills and roto-till drill:
- Precision planter cum Herbicide applicator:
- Raised bed and Ridger planters for resource conservation:
- Weeding and interculture equipment: Power weeder
- Plant protection: Sprayer and duster
- Harvester: Combine harvesters etc.

12. Livestock and dairy sector:

Climate change poses formidable challenge to the development of livestock sector in India as it is likely to aggravate the heat stress in dairy animals, adversely affecting their productive and reproductive performance.

Improved technologies & new policy initiatives are needed to enable farmers cope with climate change impacts.

- To revisit the germplasm collected so far which has tolerance to heat and cold stresses but not made use in the past due to low yield potential.
- Improved agronomic practices like adjustment of planting dates to minimize the effect of temperature increase, induced spikelet sterility can be used to reduce yield instability, by avoiding the flowering period to coincide with hottest period.
- Adaptation measures to reduce the negative effects of increased climatic variability may include

changing the cropping calendar to take advantage of the wet period and to avoid extreme weather events during the growing season.

- Improved crop management through conservation agriculture, crop rotations & intercropping, IPM, supplemented with agroforestry and afforestation schemes will be an important component in strategic adaptation to climate change.
- Organic/Natural farming and low input sustainable agriculture practices have potential to mitigate climate change.
- Huge potential for rain water harvesting and supplemental irrigation lies in rainfed ecosystem. Improved water use efficiency acts as insurance for the crop during the rainfall-deficit periods.

Strategies used for the mitigation of methane emission from livestock

Several mitigation options available for methane emissions from livestock are:

- Improved feeding management –
- Improved waste management -
- Selection of faster growing breeds -
- Grazing management -
- Lowering livestock production consumption –

Specific researchable issues needing attention:

- Crop selection to identify mechanisms and sources of resistance/resilience to abiotic stresses including heat, cold and drought.
- Genetic enhancement to cope with more variable growing conditions.
- Development of new crops to take advantage of more favorable growing conditions.
- Nutrient management for higher use efficiency is crucial in improving productivity of rainfed crops besides curbing environmental pollution and global warming.
- Carbon positive nutrient management options for soil health maintenance and reduction in green house gasses.
- Shifting of some cropping systems from locations where climate has become unsuitable to locations that have become more favorable.

LP 3.3

Climate services: Concept to approaching climate change on agriculture

V. S. Parmar[1] Minaxi K. Bariya[2] and N. J. Hadiya[1]

[1]Krishi Vigyan Kendra, JAU, Amreli

[2]CoA, JAU, Mota Bhandariya (Amreli)

Email: vparmar801@gmail.com

Introduction

In the context of growing uncertainties, Climate Service (CS) is emerging as a powerful techno-social tool that could create disruptive innovations in adaptation to climate variability and climate change. Techno-social here means integrating scientific knowledge and societal needs to manage the socioeconomic consequences of changing conditions. Climate Services are not only trying to augment the decision making process of the farmers, but in the process are also elevating their confidence in the extension services. These services could allow the farming communities to adapt to the weather variability and mitigate potential losses in agricultural output. Climate Services involve the production, translation, transfer, and use of climate knowledge and information for climate-informed decision making and planning. Given this, agriculture extension services can play a significant role in transfer of knowledge and there by assist farmers to cope up with the growing challenges. Presently there exist several Climate Service Providers (CSPs) which use Information Communication Technology (ICT) as a tool to dispense a range of climate services. The services provided by CSPs include advisories on diverse areas like soil management, weather forecasts, weather based agro-advisory, crop management, plant protection, market rates, dairy and animal husbandry. The various delivery mechanisms of CSPs include SMS, push messages, voice messages and mobile apps, meetings and trainings, local knowledge centers, farmers clubs, and announcements over the microphone in villages. Most of the advisories are formulated based on the Crop Protocols developed by State Agriculture Universities (SAUs). The CSPs also formulate committees which comprise of the SAU representatives, representatives from the state agriculture department and from the CSPs. The information processing & release of the agro advisories are generally undertaken in consultation with the experts from the committee.

Fig.1 show how the weather observations can transfer from metrological department to agriculture where value added data help to identify stress and prepared an agro advisory. This advisory communicated through various ICT tools to the farming community in the area.

Climate change and Indian agriculture

According to the Global Climate Risk Index 2021, India is one of the nation's most susceptible to the effects of climate change, ranking seventh out of 181 countries. When it comes to agriculture, it is significantly impacted by climate change, and some crops are more affected than others. Here are some of the particular crops in India that are most impacted by climate change. (Mohanty, 2020; Germanwatch, 2021)

Rice: About 68% of the total cropping area in India is rainfed, and of the roughly 40 million hectares (100 million acres) of the rice-harvested area in India, 60% is irrigated, leaving the rest dependent upon rainfall and hence susceptible to drought.

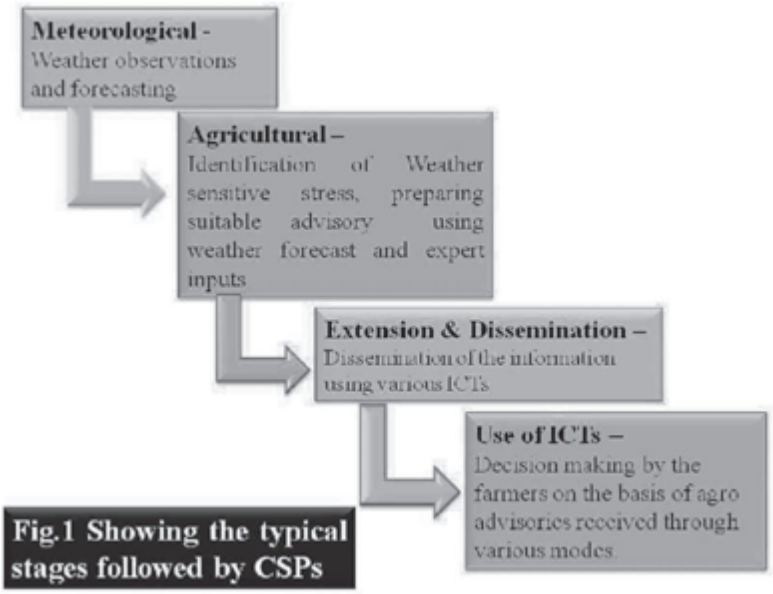


Fig.1 Showing the typical stages followed by CSPs

Climate change has increased the probability of extreme events, and heat waves, followed by drought-like conditions due to late arrival of monsoons, have impacted rice crops.

Wheat: Climate change is projected to reduce wheat yield by 19.3% in 2050 and 40% in 2080 scenarios towards the end of the century with significant spatial and temporal variations

Maize: Climate change is projected to reduce the kharif maize yields by 18% and 23% in 2050 and 2080 scenarios, respectively (Anonymous, 2023).

What a climate services are?

Climate services are defined by the World Meteorological Organization (WMO) as climate information delivered in a way that they can support decision-making of individuals or organizations at various levels of society in a changing climate.

The aim of climate services is "**to provide people and organizations with timely, tailored climate-related knowledge and information that they can use to reduce climate-related losses and enhance benefits, including the protection of lives, livelihoods, and property**". The distinction between weather services and climate services is that of timescale and customizing the information to the specific requirements of different types of end-users. Weather services deal with imminent weather, whereas climate services deal with seasonal, decadal and much longer time-frames. The end-user product of climate services is 'generally in the form of tools, products, websites, or bulletins'. This perception needs to strengthen across all categories of stakeholders of climate services (Vaughan and Dessai, 2014).

Within its wider purview, climate services also include weather services. Climate services have a more broad approach, while weather services emphasis on short-term atmospheric conditions and offer data such as current weather conditions, predictions, and alerts. Long-term climatic patterns, historical data, and future climate projections are all analyzed as part of climate services.

Stated differently, one could think of weather services as a subset of climate services. Comprehensive pictures of climate conditions is offered by climate services, which take into account both long-term climate trends and short-term weather changes.

The role of climate services in Indian agriculture

Climate services play a crucial role in Indian agriculture by providing farmers with weather and climate information and advisory services that can inform their decision-making and improve their management of related agricultural risks (L. S. Rathore and Nabansu Chattopadhyay, 2016). Effective climate services can help farmers better manage risks associated with limited water resources, drought, desertification, land degradation, erosion, hail, flooding, early frosts, and many more (Pathak, 2022). Smallholder farmers in the developing world, including India, are especially vulnerable to climate fluctuations and weather extremes, and are expected to suffer disproportionately from climate change. With institutional support and policies, advisories and climate information (historical, monitored, predicted) offer great potential to enable farmers to make informed decisions, better manage risk, take advantage of favorable climate conditions, and adapt to change.

How do climate services help Indian farmers in decision-making

Climate services help Indian farmers in decision-making by providing them with weather and climate information and advisory services that can inform their management of related agricultural risks. Here are some ways in which climate services help Indian farmers in decision-making:

- ❖ Aid in decision-making under uncertainty
- ❖ Improve management of related agricultural risks
- ❖ Enable farmers to make informed decisions
- ❖ Better manage risk
- ❖ Take advantage of favorable climate conditions
- ❖ Contribute to weather-based crop/livestock management strategies and operations

Approaches to climate services in India

In an effort to mitigate the effects of climate change and improve climate resilience, India, like many other nations, has been actively involved in the development and implementation of climate services. In

India, climate services include gathering and analysing data as well as informing different stakeholders of available information. Here are a few vital approaches for providing climate services in India:

1. Meteorological Department

The provision of climate services is mostly the responsibility of the India Meteorological Department (IMD). It gathers and distributes data on the weather and climate, such as advisories, warnings, and forecasts. IMD uses the latest innovations to increase the precision of weather forecasts and climate monitoring, including satellite imaging, remote sensing, and weather models.

- "Weather Bulletin" and broadcasts through All India Radio in regional languages.
- Agromet Advisory Services provided through DAMU and AMFU of IMD.
- "Damini Lightning App" and "Meghdoot" mobile application

2. Research and Development

India makes investments in R&D projects to improve its knowledge of climate patterns and how they affect different sectors. This involves collaboration between scientific institutions, universities, and government agencies.

- IIT Bombay's collaboration with India Meteorological Department (IMD) of the Ministry of Earth Sciences (MoES), Government of India, to develop climate solutions for the stakeholder at village, city and district level.
- Collaboration with Indian Space Research Organisation (ISRO) to improved weather monitoring and climate modeling.
- Collaboration with Indian Institute of Tropical Meteorology (IITM) on various research projects related to climate modeling, monsoon dynamics, and climate change studies.
- Collaboration with National Institute of Hydrology (NIH) to understand the impact of climate variability on water availability and distribution.

3. Early Warning Systems

For India to provide climate services, early warning system development and maintenance are essential. Early warnings of severe weather, including floods, droughts, and cyclones, aid in community preparation and damage mitigation.

4. Adaptation Strategies

The primary focus of climate services in India is developing and implementing adaptation plans to address the effects of climate change. This involves identifying the vulnerable areas and creating plans to increase resilience in the agriculture, water management, and other sectors of the economy.

- Encouraging farmers for Crop Diversification
- Climate-Resilient Varieties such as drought resistance, heat tolerance, and pest resistance
- Efficient water management practices, including rainwater harvesting, efficient irrigation techniques

5. Capacity Building

Building the capacity of various stakeholders, including government officials, local communities and businesses is essential for effective climate services. This involves training programs, workshops, and awareness campaigns to promote climate-resilient practices.

6. Public-Private Partnerships

Collaborations between the public and private sectors are encouraged to leverage resources and expertise. Private companies can contribute to the development of climate services, such as the provision of climate risk assessments for agricultural and other industries.

7. International Cooperation

India engages in international collaborations to share data, technologies, and best practices related to climate services. This helps in gaining access to global climate information and building a more comprehensive understanding of climate dynamics.

8. Community Engagement

Including traditional knowledge, supporting community-based climate adaption strategies, and making

information easily accessible and comprehensible at the local level are all critical components of successful implementation of climate services.

9. Policy Integration

Mainstreaming climate considerations requires incorporating climate services into national policies and development plans. This guarantees that the incorporation of climate resilience into development initiatives as a whole.

Agro-met Advisory Service

The Agro-met Advisory Service is integrates weather and climate data with information about agriculture practices to provide data analysis support to the professionals responsible for developing agro-met advisory services for government structures and farmers.

The Agromet Advisory Services of the India Meteorological Department (IMD) is a small step in this direction, aimed at "weatherproofing" farm production. The services meet the real-time needs of farmers and contribute to weather-based crop/livestock management strategies and operations.

Following information is given in AAS

- Significant weather of past week
- Weather Forecast next five days
- Weather Summery
- General Advisory
- SMS Advisory
- Crop stage wise advisory

Perception of farmers about AAS

The perception of farmers can vary across regions and is subject to changes based on the effectiveness of advisory services and the implementation of relevant policies.

The studies collectively indicate a positive perception of Agro-meteorological Advisory Services among farmers in India. Farmers value the timeliness and effectiveness of AAS, recognizing its role in reducing costs, enhancing crop production, and aiding in decision-making. However, a notable portion of farmers may face challenges in paying for these services, emphasizing the need for inclusive and accessible advisory programs. (Dupdal *et al*.,2020; Kumar *et al*., 2021; Praveen *et al.*,2022)

Impact of AAS in agriculture

The studies by Hussain *et al*. (2021), Nirwal *et al.* (2020), Thakur *et al.* (2020), Ramachandrappa *et al.* (2018), and Khan *et al*. (2018) collectively highlight the positive economic impact of Agro-meteorological Advisory Services (AAS) on farmers. Here is a summarized overview of the findings and conclusions from these studies:

Hussain *et al*. (2021):

Green Gram Crop:

- AAS farmers had higher total cost of production, gross return, net returns, and B:C ratio compared to non-AAS farmers.
- Despite higher costs for rice cultivation, AAS farmers achieved higher yields and a B:C ratio of 2.04.

Nirwal *et al*. (2020):

Cotton + Black Gram Intercropping:

- AAS farmers realized higher net returns and a higher B:C ratio compared to non-AAS farmers in intercropping (Cotton + Black Gram).
- Adoption of agro advisories in day-to-day operations resulted in additional benefits of 50.3% in intercropping.

Thakur *et al.* (2020):

Groundnut and Mustard Crops:

- AAS users incurred higher profits due to timely adoption of management strategies based on weather conditions.
- Changing the sowing window for Mustard crops led to increased income by reducing pest load and increasing yields.

Ramachandrappa *et al.* (2018):

- Economic impact studies indicated considerable benefits for farmers adopting agromet advisories.
- Percent gain in income due to suggested contingency cropping systems ranged from 22 to 397% over traditional cropping systems.
- Intercropping was considered a preparedness type of contingency for aberrant weather conditions.

Khan *et al.* (2018):

- AAS farmers reduced input costs in rice and maize by 1.8% and 2.4%, respectively, compared to non-AAS farmers.
- Net profit increased by 11% in rice and 14% in maize for AAS farmers.
- Reduced input costs were attributed to low input cost, following weather-based management practices, and timely management of pests and diseases.

Conclusion

Climate Services sector, in India, is in its early days and fast evolving. It gives significant result to farming community if it provided climate information with suitable advisory. Government takes initiative like DAMU to provide area specific Agro met Advisory. India hopes to improve its climate services by implementing approaches in order to better anticipate and address the problems brought on by climate change. The adoption of agro-meteorological advisories allowed farmers to make informed decisions, optimize crop management practices, and mitigate risks associated with adverse weather conditions. The positive contribution of AAS in enhancing agricultural productivity, income, and overall economic outcomes for farmers by different research carried out in India.

References

Anonymous (2023) Ministry of Agriculture & Farmers Welfare, Impact of Climate Change on Agriculture Posted On: 21 MAR 2023 6:10PM by PIB Delhi. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1909206. Accessed 13, april 2023.

Dupdal,R., B. L. Manjunatha, Rajkumar Dhakar and S .L. Patil .(2020).Perception and Economic Impact of Agromet Advisory Services: A Case Study of Thrissur AICRPAM Centre of Kerala State. *Indian Journal of Extension Education*. **56** (3):10-16

Germanwatch. (2021). Global Climate Risk Index 2021: Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2019 and 2000 to 2019.

Hussain, M., Kumar, A., R. Singh, S. Kumar , R .K. Sohane and A. Kumar (2021) Effectiveness of Weather Based Agromet Advisories on Economics of Farmers in Gaya District of Bihar. *International Journal of Environment and Climate Change*. **11**(8): 6-14

Khan, A. Ajay Kumar, C. B. Singh, V. Dubey and N. Kumar. (2018). Weather Based Agro-Met Advisory to Enhance the Production and Income of the Farmers under Changing Climate Scenario of Central Plain Zone of Uttar Pradesh, India. *International Journal of Current Microbiology and Applied Sciences* **7**(11): 221-224.

Kumar, Y, M. Singh, Fatima K., M. Nain, Manhas J., Namgyal D., M. S. Kanwar, M. Sofi, M. Singh and Angchu, S. (2021) Impact assessment of weather based agro-advisory services of Indus plain farming community under cold arid Ladakh .MAUSAM, **72**(4):897-904

Mohanty, A. (2020). Preparing India for Extreme Climate Events: Mapping Hotspots and Response Mechanisms. New Delhi: Council on Energy, Environment and Water.

Nirwal, A.D., K.K. Dakhore, P.B. Shinde (2019) A case study on economic impact of agro meteorological advisory services in aurangabad district of marathwada region. *Journal of Agrometeorology.***21** (Sp-1): 238-241.

Pathak, H. (2022) Impact, adaptation, and mitigation of climate change in Indian agriculture. *Environmental Monitoring and Assessment* 195, 52 (2023).

Praveen, K. M., Sudheer Kamath K.V., Lakshmana, Ranjeetha K. and Swathi Shetty Y.(2022). Analyzing the impact of weather based agro-advisory services of GKMS project among arecanut growers of Udupi district of Karnataka.*The Pharma Innovation Journal.* **11**(1): 07-11

Ramachandrappa,B. K., M. N. Thimmegowda, R. Krishnamurthy, P. N. Srikanth Babu , M. S. Savitha, Ch. Srinivasarao , K. A. Gopinath and G. Ravindra Chary (2018) Usefulness and Impact of Agromet Advisory Services in Eastern Dry Zone of Karnataka. *Indian Journal of Dryland Agricultural Research and Development.* **33**(1) : 32-36.

Rathore, L. S. and Chattopadhyay N. (2016) Weather and Climate Services for Farmers in India. *WMO Bulletin*. **65** (2):41-43

Thakur, S., F. H. Rahman , S. K. Bhattacharjya , A. Chakraborty , B. Mahato , C. Ghosh , P. Biswas, L. Maity, D. Dutta, S. Patra, S. Rath, M. K. Bhattacharjya and V. Pradhan (2020) Agrometeorological Advisory Service: A Key to Enhance the Farmers' Income in Red and Lateritic Zone of Purulia District of West Bengal.*Current Journal of Applied Science and Technology.* **39**(18): 55-60.

Vaughan, C. and Dessai, S. (2014) Climate services for society: origins, institutional arrangements, and design elements for an evaluation framework. *Wiley Interdiscipl. Rev.: Climate Change*,**5** (5): 587–603.

LP 3.4

Cultivating sustainability: Unveiling the potential of ITK

P. H. Vihariya, K. V. Gardhariya and Y. H. Rathwa
Extension Education Institute, AAU Campus, Anand
Correspondence Email ID: payal14.vihariya@gmail.com

"ITK is a living library of innovation, where each chapter is a testament to the ingenuity of indigenous peoples."

Concept of Indigenous Technological Knowledge (ITK) and its historical roots:

Indigenous Technological Knowledge (ITK) refers to the cumulative body of skills, practices, innovations and wisdom that has been developed and passed down through generations within Indigenous communities. It encompasses the practical and theoretical knowledge that Indigenous peoples have acquired over centuries, guiding their interactions with the environment, sustainable resource management and the development of technologies tailored to their specific cultural and ecological contexts.

ITK as the sum of total knowledge and practices which are based on people's accumulated experiences in dealing with situations and problems in various aspects of life and such knowledge and practices are special to a particular culture.

Indigenous technical knowledge (ITK) can be defined as any information originated out of farmers experience which has practical utility in solving farmers problems which is feasible, profitable and socially acceptable and adopted to farmers own conditions which moves from one generation to another by word of mouth.

Key elements of Indigenous Technological Knowledge include:

Holistic approach: ITK often takes a holistic approach, recognizing the interconnectedness of all elements in the environment- natural, spiritual, and cultural. It integrates knowledge about ecosystems, biodiversity, and social structures into a comprehensive understanding of sustainable living.

Cultural Significance: ITK is deeply intertwined with the cultural identity of Indigenous communities. It reflects their spiritual beliefs, social structures, and historical experiences. The transmission of this knowledge is often embedded in oral traditions, ceremonies, and daily practices.

Adaptability and Resilience: ITK is marked by its adaptability to changing environmental conditions. Indigenous communities have a long history of adapting their technologies and practices to respond to shifts in climate, resource availability, and other factors. This adaptability contributes to the resilience of Indigenous societies.

Localized Knowledge: ITK is context-specific and closely tied to the local environment. Indigenous peoples develop technologies and practices that are tailored to the unique ecosystems and challenges of their specific geographic regions. This localized knowledge reflects a deep understanding of the intricacies of local flora, fauna, and natural cycles.

Sustainable Resource management: ITK often emphasizes sustainable resource management practices. Indigenous communities traditionally rely on a balanced and reciprocal relationship with the environment, utilizing resources in ways that allow for regeneration and long-term viability.

India, a country spreading over 3287.26 thousand sq. km. and inhabited by about 1000 million people has been nurturing a tradition of very rich civilization over a period of five thousand years. India's ancient scriptures consisting of 4 Vedas, 108 Upanishads, 2 epics, Bhagwad Gita, Brahmasutras, 18 Purana, Manu Sniriti, Kautilya Shastra and Smritis as well as the teachings of innumerable sayings, proverbs and sages contain profound literature of ideas, concepts and practices which are designed to address the process of building harmonious relationship among man, animal and nature. The enhancement of the quality of life of the Indians who in great majority live in and depend on agricultural production systems would be impossible by keeping this rich tradition of ITK aside.

The historical roots of ITK trace back to the ancestral practices of Indigenous communities, spanning thousands of years. Indigenous peoples around the world have developed sophisticated technologies and systems of knowledge to survive and thrive in diverse environments. These technologies include methods of agriculture, hunting, fishing, shelter construction, medicine, and more. The historical roots of ITK are embedded in the deep connection Indigenous communities have with their land, their understanding of natural cycles, and their ability to adapt to changing conditions.

Despite historical disruptions caused by colonization and other external influences, many Indigenous communities continue to uphold and transmit their technological knowledge. Recognizing and respecting the historical roots of ITK is crucial for understanding its value, preserving cultural heritage and integrating this knowledge into contemporary efforts for sustainable development and environmental challenges.

The premise that traditional knowledge systems can offer innovative solutions to present-day sustainability challenges is grounded in the intrinsic connection between Indigenous wisdom and sustainable practices that have stood the test of time. By acknowledging and integrating traditional knowledge, we open the door to a wealth of insights and approaches that can contribute significantly to addressing the complex challenges of the contemporary world.

- Sustainability as a Continuum
- Holistic Approaches to Sustainability
- Localized and context specific solutions
- Adaptive strategies
- Conservation of Biodiversity
- Resilience in the face Uncertainty
- Cultural and Social Benefits

Indigenous traditional knowledge systems offer innovative solutions to present-day sustainability challenges is grounded in the recognition that Indigenous wisdom embodies a wealth of practical, adaptable, and context-specific approaches. Embracing traditional knowledge not only enriches our understanding of sustainable practices but also facilitates a more inclusive and collaborative approach to addressing the urgent challenges of the contemporary world. Importance of Indigenous technological Knowledge is below:

- ITKs are eco-friendly
- Sustainable & Time tested
- Several insects pests have developed insecticide resistance
- Degradation of natural resources
- Environmental pollution has become more persistent
- Input cost on plant protection have increased enormously
- Adaptability is high
- Compatible with the ecosystem and social system
- Increase awareness among younger generation to receive and restore knowledge

The indigenous Technical Knowledge (ITK) system has been developed by the people based on their experiences and continuous improvement through informal experimentation over centuries. These ITKs are interwoven and assimilated in the cultural life of the people. India has one of the largest collections of ancient manuscript in the world, which includes 14 sastras, 4 vedas, 4 upvedas and 6 branches of vedangas. The advent of the concept of sustainability in Indian agricultural scenario has invoked interest on indigenous technical knowledge that has the element use of natural products to solve problems pertaining to agriculture and allied activities. ITKs are based on experience, often tested over a long period of use, adapted to local culture and environment, dynamic and changing, and lays emphasis on minimizing the risks rather than maximizing the profits. ITK covers a wide range of subjects such as crop production, livestock rearing, natural resource management, food preparation, health care and many other related topics. Various aspects of agriculture and allied activities have been included in this project such as soil, water and nutrient management; crop cultivation; plant protection; farm equipment, farm power, post-harvest preservation and management; pasture and fodder management; agro-forestry; bio-diversity conservation and exploitation;

animal rearing and health care; animal products preservation and management; fisheries and fish preservation; and ethnic foods and homestead management encompass ITKs. The differences between traditional knowledge system and scientific system are indicated below:

Traditional Knowledge	Scientific Knowledge
• Knowledge is transmitted largely through oral media	• Knowledge is transmitted largely through the written world
• It is developed and acquired through observation and practical experience	• It is generally learned in a situation, which is remote from its applied context
• It is holistic, intuitive, qualitative and practical	• It is quantitative, analytical and theoretical
• It is influenced by socio cultural factors such as spiritual beliefs and communally held	• It is influenced by peer review and held by individual specialists
• Explanations behind perceived phenomena are often spiritually based on subjective	• Explanation behind perceived phenomena is essentially rational and objective
• It is used to make suitable decisions under variable conditions	• It is used to put forward a hypothesis and to verify underlying laws and constants.

The ancient wisdom of Indigenous Technological Knowledge (ITK): Sustaining communities across centuries

A. Examples of Ancient ITK Practices:

1. Agricultural Practices:

- **Milpa Agriculture:** In Central and South America, Indigenous communities have practiced milpa agriculture, a traditional farming system involving the cultivation of multiple crops like corn, beans, and squash together. This method maximizes yield, enhances soil fertility, and exemplifies sustainable land use.

2. Water Management:

- **Qanat System:** Indigenous communities in arid regions, such as Iran, have employed qanat systems for centuries. These underground channels efficiently capture and distribute water, providing a sustainable solution for irrigation and community water needs.

3. Shelter Construction:

- **Inuit Igloos:** In Arctic regions, Inuit communities have built igloos for shelter. These snow structures provide effective insulation, utilizing local materials to create energy-efficient dwellings adapted to the harsh environment.

4. Traditional Medicine:

- **Ayurveda :** In India, Ayurveda, an ancient system of medicine, integrates herbal remedies, dietary practices, and lifestyle recommendations. Indigenous communities have developed and transmitted this knowledge to address health challenges, emphasizing holistic well-being.

5. Fisheries Management:

- **Weirs and Fish Traps:** Coastal Indigenous communities worldwide, like those in Pacific Northwest and Australia, have employed traditional fish weirs and traps. These sustainable methods allow for selective fishing, preserving fish populations and maintaining ecological balance.

B. Cultural, Spiritual, and Environmental Dimensions:

6. Cultural Significance: ITK practices are deeply rooted in cultural traditions, often passed down through generations. Rituals, ceremonies, and storytelling play vital roles in preserving and transmitting this knowledge, fostering a sense of identity and belonging within Indigenous communities.

7. **Spiritual Connection:** Many ITK practices are intertwined with spiritual beliefs, acknowledging a profound connection between humans and the natural world. Rituals associated with agriculture, hunting, and other activities reflect a spiritual reverence for the environment.
8. **Environmental Ethics:** ITK inherently embodies environmental ethics. Indigenous communities view nature not merely as a resource but as a living entity with intrinsic value. Practices are designed to ensure the sustainability of ecosystems, recognizing the reciprocal relationship between humans and the environment.

C. Interconnectedness between ITK and Sustainable Living:

9. **Holistic Resource Management:** ITK emphasizes holistic resource management, acknowledging that decisions affecting one aspect of the environment have broader implications. Practices like rotational agriculture and controlled burns showcase a deep understanding of ecological interconnectedness.
10. **Regenerative Practices:** Many ITK practices focus on regeneration rather than exploitation. Sustainable harvesting, coupled with rituals that honour the spirits of harvested plants or animals, demonstrates a commitment to maintaining the health and abundance of natural resources.
11. **Community Collaboration:** ITK fosters a sense of community collaboration in sustainable living. Decision-making processes often involve communal discussions, ensuring that the knowledge is applied collectively and benefits the entire community rather than a few individuals.
12. **Adaptability to Local Contexts:** ITK is adapted to specific geographic and cultural contexts. Practices are designed to suit local ecosystems, considering factors like climate, soil conditions, and biodiversity. This adaptability contributes to the long-term sustainability of ITK.

By exploring the ancient wisdom of ITK, we recognize its time-tested practices that have sustained Indigenous communities for centuries. Beyond the practical aspects, the cultural, spiritual, and environmental dimensions highlight the holistic nature of ITK, revealing its inherent interconnectedness with sustainable living practices.

Process and methods of ITK analysis

A. Identification and collection of ITK: methods and techniques

1. Documentation of oral histories
2. The Delphi method
3. Agro-ecosystem analysis a) Mapping (ecological, agronomic, seasonal, spatial) b) Transect walk
4. Manual discriminative analysis (ask farmers to discriminate practices and find rationality)
5. Decision tree analysis
6. Use of local resource persons
7. Linguistic and historic analysis of concepts, vocabulary and key words
8. Ethnobotany
9. Critical incident analysis (farmers' seed exchanges and new variety introduction)
10. Analysis of peasants' journals and newspapers 11. Arranging competition
11. Conducting documentation workshops
12. Continuous interactions during on-farm experiments
13. Anthropological methods (investigation into the social, culture and other aspects of rural tradition)
14. Local taxonomy
15. Hear-say method
16. Crop histories
17. Survey method
18. In-depth interview of farmers.

B. Documentation

Types of documentation

1. Documenting large variety of practices without scientific validation
2. Documenting prevalent practices and comparing them with traditional ones

3. Documenting the practices/details of experimentation on a specific aspect and understanding the various linkages
4. Documenting the practices evolved to mitigate specific problems of farming or for sheer survival under conditions of ecological and economic stress
5. Documenting practices that had evolved in response to specific external interventions

Methods and Techniques:

- Notes
- Photos
- Audio-recordings
- Video-recordings

C. Testing and Validation: method and techniques

1. Prepare a list of all the collected ITK practices
2. Decide the continuum for rating the rationality of ITK with specific weightages
3. Send the list of ITK practices to experts for their opinion and judgement on each practice.
4. Calculate the weighed mean score of individual practices.
5. Select practices above mean score as rational.

Continuum	Weightages
Very rational	5
Rational	4
Undecided	3
Irrational	2
Vey irrational	1

Role of ITK for cultivating sustainability:

The role of Indigenous Technological Knowledge (ITK) in cultivating sustainability is multifaceted and holds significant potential for addressing environmental, social, and economic challenges. Here's an exploration of the key roles ITK plays in fostering sustainability:

1. Environmental Stewardship:

- **Ecosystem Management:** ITK often incorporates traditional practices for sustainable resource management. Indigenous communities, through centuries of observation and interaction, have developed techniques to ensure the responsible use of natural resources without depleting them.
- **Biodiversity Conservation:** Indigenous knowledge often includes a deep understanding of local flora and fauna, contributing to the preservation of biodiversity. ITK emphasizes the interconnectedness of species and ecosystems.

2. Climate Resilience:

- **Adaptation Strategies:** Indigenous communities often possess knowledge about climate patterns and changes. ITK provides adaptive strategies to cope with environmental shifts, helping communities build resilience to the impacts of climate change.
- **Traditional Agricultural Practices:** Many indigenous agricultural methods focus on sustainability and resilience, utilizing local and hardy crop varieties that are well-suited to specific climates.

3. Cultural Sustainability:

- **Preservation of Cultural Heritage:** ITK is intertwined with the cultural identity of indigenous communities. By preserving and promoting ITK, there is an inherent commitment to safeguarding cultural heritage, ensuring the sustainability of unique traditions, languages, and practices.
- **Intergenerational Knowledge Transfer:** The passing down of ITK from generation to generation ensures the continuity of valuable insights. This knowledge transfer not only sustains cultural practices but also maintains a connection with the environment.

4. Community Well-beling:

- **Health and Medicinal Practices:** Traditional healing methods, often rooted in ITK, contribute to community health. Indigenous medicinal knowledge involves the sustainable use of local plants and natural resources for healthcare.
- **Social Harmony:** ITK emphasizes community collaboration and harmony with nature. This communal approach fosters social well-being and solidarity, contributing to overall community resilience.

5. Sustainable Economic Practices:

- **Local Economies:** Indigenous communities often engage in sustainable economic activities, such as traditional crafts, agriculture, or eco-friendly practices. ITK can guide the development of economic models that align with environmental conservation and community well-being.
- **Resource Use Efficiency:** Traditional knowledge often includes efficient ways of using resources. By incorporating ITK, communities can optimize resource utilization, minimizing waste and environmental impact.

6. Community Empowerment and Participation:

- **Inclusive Decision-making:** ITK promotes community participation in decision-making processes, ensuring that sustainability initiatives respect and incorporate local perspectives.
- **Empowerment through Education:** By recognizing the value of ITK in formal and informal education, indigenous communities can empower their members to actively engage in sustainable practices.

Conclusion:

It highlights the critical role of indigenous technological knowledge for fostering sustainability. This exploration underscores the significance of traditional wisdom and practices in maintaining ecological balance, biodiversity, and harmony with nature. Indigenous communities possess a wealth of knowledge accumulated over generations, offering valuable insights into sustainable living. The integration of indigenous technological knowledge into contemporary approaches holds promise for addressing global challenges such as climate change, resource depletion, and environmental degradation. By recognizing, respecting, and collaborating with indigenous communities, there is an opportunity to develop more holistic and culturally sensitive solutions to pressing sustainability issues. This not only ensures the preservation of unique cultural heritage but also contributes to a more sustainable and resilient future for all.

References:

Prakash, N., Roy, S. S. and Ngachan, S. V. (2019). Role of ITK in Conservation Agriculture: Blending Indigenous and Scientific Knowledge, (ICAR Research Complex for NEH Region, Umiam – 793103, Meghalaya).

Pandey, V., Mittal, R.and Sharma, P. (2017) Documentation and Application of Indigenous Traditional Knowledge (ITK) for Sustainable Agricultural Development. *Asian Journal of Agricultural Extension, Economics & Sociology.* 15(3): 1-9.

Satapathy C S, Veeraswami, Satapathy B. (2002). Indigenous technical knowledge: Method of documentation and rationalization. Indian J Traditional Knowledge. 12:14-23.

Warren D M. Using indigenous knowledge in agricultural development: World Bank Washington DC. (World Bank); 1993.

LP 3.5

Green prosperity: Unveiling the potential of carbon credits in harmony with natural farming for sustainable agriculture in India

N. M. Kachhadiya, V. S. Parmar, P. J. Prajapati and H. C. Chhodavadia
Junagadh Agricultural University, Junagadh
Email: nileshmk.aau@gmail.com

Introduction

In India's quest for sustainable agriculture, the convergence of carbon credits and natural farming practices presents a promising avenue for promoting green prosperity. This paper examines the mutually beneficial relationship between carbon credits and natural farming, examining how their integration can open the door to ecologically responsible and commercially successful agricultural practices.

Natural farming in India has the potential to generate carbon credits through carbon sequestration, which can be traded in the voluntary carbon markets. Carbon farming is a system of agricultural management that helps the land store more carbon and reduces the amount of greenhouse gases that it releases into the atmosphere. When farmers follow regenerative practices, they can sequester one to four carbon credits per acre, which can be traded in the carbon markets. Carbon credits represent quantities of greenhouse gases kept out of or removed from the atmosphere, and farmers can earn revenue by sequestering carbon. The ability to trade carbon credits at voluntary carbon markets can serve as an incentive for farmers to adopt sustainable farming practices, including natural farming. The number of carbon farming projects in India is increasing, and India is expected to become the leading market for carbon farming credits, as it has vast farmland and much of it is owned by smallholder farmers.

Definition and concept of carbon credits

Carbon credits, also known as carbon offsets, are permits that allow the owner to emit a certain amount of carbon dioxide or other greenhouse gases. One carbon credit represents the right to emit one ton of carbon dioxide or the equivalent in other greenhouse gases. (Reichle, 2020) Carbon credits are part of a cap-and-trade program, where companies are awarded credits that allow them to continue to pollute up to a certain limit, which is reduced periodically. Companies can sell any unneeded credits to another company that needs them, creating a market for carbon emissions reductions.

Carbon credits are considered high-quality when they represent measurable, verifiable emission reductions from certified climate action projects. These projects can include reducing, avoiding, or removing greenhouse gas emissions, and often bring additional benefits such as empowering communities, protecting ecosystems, restoring forests, or reducing reliance on fossil fuels. High-quality carbon credits are part of the Integrity Council for the Voluntary Carbon Market's (ICVCM), Core Carbon Principles (CCPs).

Synergies between Carbon credits and natural farming

Carbon credits and natural farming can be beneficial for both the environment and the farmers. Some of the potential synergies include:

1. **Enhancing Soil Health**: Natural farming practices, such as organic soil management and biomass recycling, contribute to carbon sequestration and improve soil health, which in turn can increase the number of carbon credits that can be generated. (Avasiloaiei *et al*., 2023)
2. **Increased Income Stream**: By participating in carbon credit programs, farmers can earn additional income through the sale of carbon credits, providing a financial incentive for adopting sustainable farming practices. (Girish and Trivedi, 2022)
3. **Government Support:** Governments can align existing natural farming, regenerative farming, and organic farming schemes with carbon credit programs to nudge farmers to participate in carbon credit programs. This can include regular estimation of soil carbon levels and sharing data with carbon credit verifiers to facilitate measurement and verification processes. (Girish and Trivedi, 2022)

4. **Co-benefits:** Carbon credit programs that consider co-benefits, such as reduced use of synthetic fertilizers and increased soil health, help ensure higher adoption rates by farmers.
5. **Ecosystem Benefits:** Carbon farming not only sequesters carbon but also promotes biodiversity, reduces erosion, and improves water retention, benefiting the overall ecosystem.

Natural farming practices contribute to carbon sequestration and emission reduction

According to Barbato and Strong (2023), organic soil management is a collection of techniques intended to increase carbon inputs and decrease carbon losses, hence promoting soil organic carbon retention. Integrative nutrient management, mulching, cover crops, conservation tillage, and other techniques are essential to this process.

Recycling biomass, especially on-farm recycling and mulching, is another essential component that helps maintain soil fertility and increases soil organic carbon levels, which in turn helps sequester carbon in the soil. One of the most important aspects of natural farming is cutting greenhouse gas emissions. This is accomplished by reducing the amount of synthetic fertilisers and pesticides used which effectively reduces greenhouse gas emissions into the environment and is in line with emission reduction targets.

Furthermore, Avasiloaiei *et al*., 2023 study emphasises that implementing natural farming practices improves soil health overall. Enhanced soil carbon sequestration and improved carbon storage within the soil matrix are consequent benefits of improved soil health. Natural farming has advantages that go beyond sequestering carbon dioxide; these include enhanced water retention, decreased erosion, and biodiversity preservation. These co-benefits support overall ecosystem health in addition to helping to reduce emissions. Essentially, natural farming is a comprehensive strategy that promotes sustainable agriculture techniques that have significant positive effects on the environment and ecology, in addition to addressing carbon sequestration, fertilisers and pesticides, so reducing greenhouse gas emissions and contributing to the achievement of goals to decrease emissions.

Extension strategies that can be employed to Encouraging and preparing organic farmers for carbon credit earning

1. **Education and Training Programs:**
   - **Workshops and Seminars**: Hold frequent workshops and seminars to inform organic farmers on the value of storing carbon in the soil, the concept of carbon credits, and the possible financial rewards.
   - **Instructional Plans**: Provide training courses that emphasise organic farming techniques that improve sequestration of carbon, like decreased tillage, agroforestry, and cover crops.
2. **Technology Adoption:**
   - **Tools for Measuring Carbon**: Give farmers access to instruments and technologies that allow them to measure and track the amount of carbon in their soil. Kits for testing soil carbon and remote sensing technology are examples of this.

     Promote the application of precision agriculture technologies to improve soil health, minimise emissions, and maximise inputs.
3. **Demonstration Farms**
   - **Model Farms**: Create exemplary organic farms that effectively employ carbon sequestration techniques. These farms can demonstrate to other farmers the advantages of sustainable farming methods.
4. **Financial Incentives:**
   - **Grants and Subsidies:** Promote grants and subsidies from the public or commercial sectors to help organic producers use carbon-friendly techniques. This can involve providing funds for the purchase of tools, seeds or the execution of certain carbon sequestration techniques.
   - **Access to Carbon Markets:** Help farmers find buyers of carbon credits and guide them through

the carbon markets.

5. **Certification Programs:**
   - **Carbon Certification:** Create or support certification schemes that honour and incentives organic farmers for their efforts to sequester carbon. Customers that are concerned about the environment may be able to purchase this certification as a label.
6. **Policy Advocacy:**
   - **Policy Support:** Policy Support: Promote laws that give farmers incentives to sequester carbon. This could entail advocating for the incorporation of organic agricultural methods into carbon offset initiatives and emissions trading plans.
7. **Networking and Collaboration:**
   - **Farmers' Associations**: Encourage the establishment of cooperatives or associations for organic farmers in order to establish a network for the exchange of information, expertise and resources about carbon-friendly farming methods.
   - **Cooperation with Academic Institutions:** Encourage cooperation between agricultural research organisations and organic farmers to stay abreast of the most recent advancements in sustainable farming techniqus.
8. **Extension Services :**
   - **Extension Officers:** Hire experts or extension officers who can collaborate closely with organic farms to offer on-the-ground instruction, troubleshooting, and advise on putting carbon sequestration strategies into effect.
9. **Information Dissemination:**
   - **Information Campaigns:** To increase public knowledge of the advantages of organic farming for carbon sequestration, launch information campaigns through a variety of media, including radio, television, social media, and local events.
10. **Long-Term Support:**
   - **Sustained Support Systems:** Create long-term support networks to help farmers overcome obstacles and adjust to changing methods. This can involve continual learning, observation, and adjustment to shifting market dynamics.

Conclusion

In light of India's current agricultural transition, the combination of natural farming with carbon credits appears to be a promising new direction. Green prosperity is attainable, where farmers secure a successful and sustainable future for themselves and future generations while also playing a major role in environmental conservation. The combination of carbon credits and natural farming is a comprehensive strategy for a greener, wealthier India, as well as a paradigm change in agriculture.

References

David E. Reichle (2020) The Global carbon cycle and climate change scaling ecological energetics from organism to the biosphere. Elsevier: 253-287

Avasiloaiei, D. I.; Calara, M.; Brezeanu, P. M.; Gruda, N. S.; Brezeanu, C. (2023) The Evaluation of Carbon Farming Strategies in Organic Vegetable Cultivation. *Agronomy*, ***13***(9):2406.

Girish, G. and Trivedi, R (2022) Monetising carbon credits: How Indian farmers can benefit. https://idronline.org/article/agriculture/monetising-carbon-credits-how-indian-farmers-can-benefit.

Barbato, C.T., Strong, A. L. (2023) Farmer perspectives on carbon markets incentivizing agricultural soil carbon sequestration. *npj Climate.Action,* **2** (26):1-8

LP 4.1

Gender sensitization and women empowerment

Hemlata Saini, J. B. Patel, Anusha Velamuri and Ravikumar Chaudhari
Anand Agricultural University, Anand, Gujarat
Email: hlatahem@gmail.com

Introduction

India has taken challenge of modernizing its economy, reducing poverty and improving living standards of its population. Women power is crucial to the economic growth of any country. Our constitution has granted equal rights to women but in fact they are subjected to differential treatments. A female baby is still unwanted. A girl does not enjoy as much care and attsention of her parents as a boy enjoyed. India cannot prosper as a nation unless and until efforts are being made to empower women so that there is equal participation of women in economic growth of the country. Reformation in society with special reference to gender differences is possible only through gender sensitization. Sensitization means to create awareness to change the prejudices and discriminative behavior towards the downtrodden section of the society such as woman. So, Gender sensitization refers to modification of behavior by raising awareness about gender equality concerns. But "empowerment" means moving from a weak position to stronger position to execute a power. The root cause of gender inequalities lies in discriminatory social norms, attitudes and beliefs that shape how women and men behave, their opportunities and aspirations. The gap between men and women – the gender gap – imposes high costs on agriculture and food systems, the broader economy, and on women and their families. To overcome the marginalization of rural women, it is crucial to address gender issues in policies, programmes and investments in agriculture and food systems. Achieving gender equality means ensuring that men and women fully enjoy their rights and have the same opportunities and entitlements in civil and political life. This can be achieved by addressing their specific needs and priorities and by providing them with the same engagement, treatment and benefits.

Women empowerment in India

The term women empowerment is all about authority, or the power embarked on women sharing indistinguishable rights. The term refers to the liberation of women from socio-economic restraints of reliance. Women comprise around 50% of the country's population, and a bulk of them stays economically dependent on each other without employment. Women empowerment in India is dependent up to a great extent on numerous different variables that encompass geographical setting (urban/rural), social status (caste and class), educational status, and age factor. Actions on the women empowerment exist at the state, local (panchayat), and national levels. However, women encounter differentiation in most sectors like education, economic opportunities, health and medical assistance, and political participation, which demonstrates that there are substantial gaps between strategy advancements and real exercise at the community level. Women are known for delivering multiple roles effortlessly per day, and thus, they are considered the backbone of every society. Living in male-dominating societies, women play a wide range of roles, such as caring mothers, loving daughters, and capable colleagues. The best part is that they fit the bill perfectly in every role. Nonetheless, they've also stood as a neglected bunch of society in different parts of the world. In turn, it has resulted in women surviving the brunt of unevenness, financial trustworthiness, oppression, and distinct social evils. Women have been residing under the shackles of enslavement for centuries now that impedes them from attaining professional as well as personal highs.

Why to empower women or girls?

Women's empowerment is the process of supporting the advancement and enhancement of women's power and agency to expand their ability to control their lives. It implies empowering and enabling men and women to participate more effectively in agrifood systems, which also translates into improving the well-being of their children and future generations. As such, achieving gender equality and empowering rural women, men, girls and boys will not only improve nutrition, health and education outcomes, it will also bring both immediate and long-term economic and social benefits for families, communities and nations at large. It encompasses dimensions such as resources and services, agency and power.

Women's empowerment and promoting women's rights have emerged as a part of a major global movement and is continuing to break new ground in recent years. Days like International Women's Empowerment Day are also gaining momentum. But despite a great deal of progress, women and girls continue to face discrimination and violence in every part of the world. Empowering women is essential to the health and social development of families, communities and countries. When women are living safe, fulfilled and productive lives, they can reach their full potential. Contributing their skills to the workforce and can raise happier and healthier children. They are also able to help fuel sustainable economies and benefit societies and humanity at large. A key part of this empowerment is through education. Girls who are educated can pursue meaningful work and contribute to their country's economy later in life. They are also four times less likely to get married young when they have eight years of education, meaning that they and their families are healthier.

Factors affecting women's empowerment in India

1. **Gender Discrimination must be Checked**- The problem of gender discrimination has affected the pace of women empowerment in India. Gender discrimination in all realms of action must be checked.
2. **Educational Factor-** Education is the most vibrant factor of advancement and growth. It is the only significant tool for forestalling women empowerment in India & human resource development. It gives light to the possibilities for access to employment and making a livelihood, which in twist rejuvenate economic empowerment to women.
3. **Transformation through Mass Media-** The mass media is responsible for playing a significant function to project and propagate associated issues, most specifically about women empowerment in India. The numerous programmes pertaining to women's prestige revealed the mass media enable her husband to behave toward her wife with loads of honor and respect
4. **Changes in Women's Attitude-** Women should empower themselves by becoming to be aware of their oppression, indicating initiative, and confiscating chances to bring a shift in their status. Empowerment must come from within the soul. Women need to empower themselves by bringing a major change in their attitude.
5. **Organization for Awareness Programmes-** State and National level commissions for women, Non-Governmental Organizations, ICDS Programmes, must undertake e- awareness, the Taskforce for women & children Development DWACRA (Concerning Development of Women & Child in Rural Areas), women's rights, human rights, a campaign about legal rights, education about saving schemes, population education, environmental education, rehabilitation programmes with all integrity and solemnity.

Rural women are torchbearers for social, economic and environment transformation for the 'New India'. In India, Agriculture employs about 80 percent of rural women. Empowering and mainstreaming rural women workforce in agriculture can bring paradigm shift towards economic growth. It will enhance food and nutrition security and alleviate poverty and hunger. It's a win win strategy for achieving Sustainable Development Goals by 2030.

In India, reforms are underlined for holistic development of women, enabling socio-economic and health security. Since Independence, several government flagships schemes and programmes are initiated to improve rural women stature in society by creating livelihood opportunities and engagements in paid employments. Various schemes, such as the Prime Minister's Employment Generation Program (PMEGP), National Livelihoods Mission, Deen Dayal Upadhayay Grameen Kaushalya Yojana (DDU-GKY), Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Beti Bachao Beti Padhao, Pradhan Mantri Matru Vandana Yojana I (PMMVY), etc. has made significant contributions in creating gender parity and socio-economic empowerment of women in India. Now, rural women have availing access to education, productive resources, capacity building, skill development, healthcare facilities and diversified livelihood opportunities through government beneficiary schemes.

Strategies to promote gender sensitization

After having deep insight into the socio–economic inequality and understanding the psychological

situations of the people different strategies can be planned. Following strategies promote gender sensitization and women empowerment.

1. **Providing priorities to women education:** It may be mentioned here that University Grant Commission has been promoting the content of women's studies and more specifically setting up Centers of Women's Studies.
2. **Providing space for individual children** where they can practice democratic ways of interacting with each other and build skills to negotiate with conflicts outside the school. For girls in particular, school and classrooms should be spaces to discuss processes of decision making, to interrogate the basis of their decisions and to make informed choices.
3. **Encouraging educational activities** in school for inculcating moral values among children and equal respect for boys and girls.
4. **Seminars, workshops and training program** are to be conducted regularly to make the girls aware of their roles and abilities in the family and society and how they have to equip themselves to face a fruitful professional life.
5. **Enhancing gender equity** by expanding women's access to justice and women human right.
6. **Combating gender-based violence**
7. **Emphasize economic empowerment** of woman (such as through rural tourism or traditional handloom revive, etc.)
8. **Strengthening the capacity of organizations** that advocate for gender equity, women empowerment and the elimination of gender-based violence.
9. **Training of women in remote areas**, especially in rural areas, with restricted mobility.

Conclusion

Even in today's world, despite women's place as equals, liberated individuals with inherent dignity remains a pipe dream. Throughout the previous five years, India has promoted policies, plans, bundles, and initiatives aimed at enhancing women's empowerment in social and economic spheres. Given that women in today's world are highly educated—graduate-level educated, in fact—and hold higher managerial positions, it is impossible to dispute the government's attempts to ameliorate the situation. Some of these ladies have started their own businesses. Women's empowerment is becoming increasingly vital in today's globe, not only in India, but in the development of all nations. Despite the government and non-governmental organisations' tremendous efforts, the current state of women's empowerment is unsatisfactory.

Limited opportunities for education and work will only hasten the process; yet, attitudes must shift. Conflicts between son and daughter can often be caused by the gender bias that mothers themselves instill in them. It is impossible to claim that women in India are in any way empowered until this mindset is altered.

References

Allana, A., Asad, N., & Sherali, Y. (2010). Gender in Academic Settings: Role of Teachers. International Journal of Innovation, Management and Technology, 1(4), 343-348.

Barodia, S. (2015). Gender Sensitization and Education. International Journal of Interdisciplinary and Multidisciplinary Studies, 2 (4), 107-113.

Gure, G. S. (2016). Gender Sensitisation: Significance of Education. International Education and Research Journal, 2 (12), 117-119.

institutions. International Journal of Humanities and Social Science Invention, 6 (6), 38-40.

Iyengar, R. G. (2016). Gender Sensitization in Education: A Pathway to Women Empowerment, International Journal of Recent Trends in Engineering & Research, 2 (12), 74-76.

Rao, G. V. (2004). Women and Society, Himalaya Publishing House, New Delhi.

Sharma, R. (2017). Gender Sensitization: An Appraisal of the Roles of Teachers and Educational

LP 4.2

Differential needs of rural women and their problems in agriculture sector

Surendra Kumar Rai, Aparna Jaiswal, S. S. Salunkhe and Aniket R Deshpande

[1]Assistant Professor, College of Agriculture, Balaghat, JNKVV. Jabalpur

[2]Assistant Professor, College of Agriculture, Ganjbasoda, JNKVV. Jabalpur

[3]Scientist, Krishi Vigyan Kendra, Navsari Agricultural University, Navsari

[4]Assistant Professor, Department of Agril. Extension & Communication, SDAU, Sardarkrushinagar

Email: surendrarai@jnkvv.org

Agriculture is known as a fundamental instrument for sustainable development and an imperative practice for livelihood and economic development. It helps in poverty reduction as it is the main source of food, income and employment for rural population of the world. Despite the fact that women have proved themselves as the backbone of agriculture, their hard work have unrecognized and unpaid. Women are engaged in the most tedious and back-breaking tasks viz producing crops, animal husbandry, and forestry etc. Moreover, they also play a critical role in the household works, providing food, caring for children, elderly and the sick.

The rural women comprise a quarter of the world's population. The United Nations Food and Agriculture Organization (FAO) estimates that at least 80% of rural smallholder farmers worldwide are women. They produce as much as 50% of the world's food and 90% of the food grown in Africa but many of them go hungry, ActionAid (2011). In Indian scenario around 84% of rural women are depending on agriculture for their livelihood. Women make up about 33% of cultivators and about 47% percent of agricultural labourers. Women's participation rate in the agricultural sectors is about 47% in tea plantations, 46.84% in cotton cultivation, 45.43% growing oil seeds and 39.13% in vegetable production (Rao, 2006, Women in agriculture, 2023).

There has been a lot of talk about agriculture as the “driver of development” and the important role of women in agriculture and household food security. Ironically, despite having crucial role in agriculture, women face numerous challenges that limit their potential in agricultural development. Interesting research by Saito et al. (1994) has shown that with equal access to land and inputs, African women farmers produce 20% more than men. But ironically most women farmers are not getting this support. The trouble is that family, society and governments focus on women's roles and responsibilities – but not on their rights as women and as farmers. Economic Survey 2017-18 reported that migration by rural men leads to 'feminisation' of agriculture sector which again put pressure on women for multiple roles as cultivators, entrepreneurs, and labourers. This situation has been worsening over the time. As per Census 2011, out of total female main workers, only 12.8 per cent of them had ownership of lands which reflects the gender disparity in land holding in agriculture (Role of women, 2023).

Problems

There are numerous said and unsaid problems and challenges faced by women famers. These challenges might include limited access to education, training, land ownership, finance, technology and markets etc. Rural women are often concentrated in low-skilled, low-productivity and low or unpaid jobs with long working hours, poor working conditions and limited social protection. They are less likely to be wage earners, and if they are, earn less compare to men. Moreover, they have unequal land rights and limited livelihood options that aggravate financial crises especially in women- headed families.

1. **Participation in decision making**
   Women have little control over decision making process, either inside home or outside home. They face cultural and traditional barriers that prevent them from participating in decision-making processes.
2. **Land Ownership:**
   Land is a critical asset for agricultural production, yet women often face significant barriers to land ownership and control. In many countries, cultural and legal norms prioritize male inheritance and ownership, leaving women without access to land. Addressing these barriers and providing women with

secure land tenure can improve their productivity, income, and decision-making power in agricultural production.

3. **Gender-Based Violence:**
   Women in agriculture are often subjected to gender-based violence, including sexual harassment, assault, and exploitation. Addressing gender-based violence in agricultural settings is essential for protecting women's human rights, promoting their safety and well-being, and enabling them to participate fully in agricultural development.
4. **Women in Farms**
   Women in small farms are the backbone of subsistence agriculture. They perform variety of tasks including all un-mechanized agricultural tasks eg sowing, weeding, harvesting, etc. which add more burden to them due to lack of equipment and appropriate technology. However, they have limited access to use of productive and also face challenges such as unequal pay, limited access to education and training.
5. **Gender Discriminations:** Another issue is the problem-ridden conceptualization of women's and men's work in rural environments, in particular, the failure to recognize the importance of their differing roles. Analysis of the gender division of labour has revealed that women typically take on two type of roles in terms of the paid and unpaid labour they undertake.
6. **Education:** Women farmers in agricultural sector suffer from high illiteracy rate. They do not know their legal rights. Hence, education is one of the key factor which affect their growth and livelihood.
7. **Nutrition and health:** As an estimate between 40 to 50% of urban women and between 50 to 70 % of rural women suffer from anemia. A significant section of men and women continue to be at least 5 to 8 kg less than the desirable weight. Mean intake of 2100 calories by women suggests that 50% of the population is subsisting on deficit diet which is less than 2100 calories. Chronic low level of energy intake and increase in the work demand obviously effects women's health and nutritional status negatively. (Jayasheela, 2015).
8. **Credit and financial services:** Poor women farmers are less able to purchase technology to adapt to climate change due to lack of access to credit and agricultural services. They often have low productivity due to an inability to invest in things such as improved seeds and soil replenishment.
9. **Market:** Lack of market intelligence and inadequate information put women farmers under unfavourable situation with weak bargaining power with the buyers.

Needs

It is high time for change and to do more, and do it better. At the heart of the Sustainable Development Goal pledge of "leaving no one behind" there should no women leaving behind anywhere. Promoting and ensuring gender equality through decent work and productive employment not only contributes to inclusive and sustainable economic growth. This will also enhance the effectiveness of poverty reduction and food security initiatives, as well as climate change adaptation efforts. There are following issues need to be focused as given below:

1. **Gender Equity**
   Gender equity is critical for achieving sustainable development goals and ensuring the well-being of women and their families. Providing them with education and training. It also involves promoting gender equity and reproductive rights, reducing gender-based violence.
2. **Women empowerment:**
   Empowering women in agriculture is critical for achieving sustainable development and food security. Empowerment involves increasing women's access to resources such as land, water, and seeds. Empowering women in agriculture through education, and contribute to gender equality and social justice.
3. **Leadership and Innovation:**
   Leadership and innovation are essential for promoting gender equity in agriculture. Women's leadership in agriculture can help address gender inequality, promote sustainable agriculture practices, and increase productivity and income. Moreover, financial and technological innovation can help women overcome the barriers they face in agriculture, such as limited access to credit and markets.

4. **Access to Education:**
   Education is a key factor in improving women's productivity and economic status in agriculture. However, many women in rural areas do not have access to quality education due to cultural, social, and economic barriers. Providing education and training in agricultural practices, financial management, and entrepreneurship can help women increase their productivity, income, and leadership skills.
5. **Finance and Technology:**
   Women in agriculture often lack access to finance and technology, which limits their ability to invest in their farms and adopt sustainable practices. Providing financial services tailored to women's needs and promoting the use of appropriate technologies can increase women's productivity, reduce their workload, and improve their resilience to climate change.
6. **Holding governments accountable**
   When governments fail to carry out their responsibilities, it is the duty of citizens to hold governments accountable. This is a tool to help women farmers to know and claim their rights. The information can be used to frame policy demands to government and make governments accountable. It can be used to support government to design interventions to promote the rights of women smallholder farmers
7. **Markets:**
   Access to markets, reliable information about markets, and competitive pricing are essential for economic empowerment of women. Women in agriculture often face barriers to accessing markets due to limited mobility, lack of information, and gender-based discrimination. Providing access to markets and market information can help women increase their income, reduce their dependence on subsistence farming, and contribute to economic growth.

Approaches for empowering women in agriculture

Successful approaches for empowering women in agriculture include:

1. Providing education and training in agricultural practices, financial management, and entrepreneurship.
2. Promoting gender equity and addressing gender-based violence in agricultural settings.
3. Providing secure land tenure and legal protection for women's land rights.
4. Providing financial services tailored to women's needs and promoting the use of appropriate technologies.
5. Promoting access to markets and market information.

Conclusion:

Women have been contributing enormously to agricultural growth and development through their active involvement. Women's contribution varies across regions, socio-cultural and agro-production systems. Evidently women's contribution to agriculture is critical for sustaining life on the planet. Empowering women in agriculture, promoting gender equity, increasing women's leadership in the sector are crucial for achieving sustainable development and food security. Addressing gender inequality in agriculture requires a global and local approach, involving policymakers, private sector, civil society, and women themselves.

References:

Action Aid (2011). WHAT WOMEN FARMERS NEED: A blueprint for action. https://actionaid.org/sites/default/files/the_blue_print_for_women_farmers.pdf

Jayasheela G (2015). THE ROLE OF WOMEN: IN INDIAN AGRICULTURE SECTOR. IJCRT, 3 (2), pp 375-382.

Rao E. K (2006). Role of Women in Agriculture: A Micro Level Study. Journal of Global Economy, 2(2), pp 107-118.

Role of women in agriculture and its allied fields (2023 Oct. 09) Retrieved from https://vikaspedia.in/agriculture/women-and-agriculture/role-of-women-in-agriculture-and-its-allied-fields

Saito K. A. (1994). Raising the Productivity of Women Farmers in Sub-Saharan Africa. World Bank Discussion Papers: Africa Technical Department Series No. 230. Washington DC.

Women in agriculture in India (2023 Oct. 09). Retrieved from https://en.wikipedia.org/wiki/Women_in_agriculture_in_India

LP 4.3

Gender sensitive technology and women-led development

Serene Shekhar and Sarita Sanwal
Department of Extension Education and Communication Management
Sardarkrushinagar Dantiwada Agricultural University, S K Nagar
Email: shekhar.sdau@gmail.com

Introduction

Feminization of agriculture has taken place. As per the 10th Agriculture Census (2015-16), the percentage of female operational holdings in the country have increased from about 13% percent during 2010-11 to around 14% during 2015-16. Agriculture, contributing around 16% of the GDP, is increasingly becoming a female activity. Agriculture sector employs 80% of all economically active women; they comprise 33% of the agricultural labour force and 48% of self employed farmers. About 18% of the farm families in India, according to NSSO Reports are headed by women. According to the Economic Survey 2017-18, a rise in migration of men from rural to urban areas has resulted in feminization of agriculture. About 17.3 per cent of women in rural areas and 4.9 per cent of women in urban areas pursued one or more of the activities relating to agricultural production including free collection of agricultural products and processing of primary products produced by the households, for household's consumption.

Causes of feminization of Indian agriculture

1. **Gender-Division of Work:** Women are more willing to accept low-paid irregular work, are easy to hire and fire, are thought to be docile and hardworking, and certain jobs are typified as women's work.
2. **Social Mobility and Migration -** Reserved for Males: Men are generally perceived as breadwinners, as they receive more education opportunities and are preferred for physical labor. As a result, in the Indian rural belt, males are more likely to migrate and move from rural to urban areas in search of better jobs, while females are primarily responsible for household chores and agriculture.
3. **Poverty:** Because of poverty, women often work as agricultural laborers or domestic laborers in order to supplement the family's income, or as domestic laborers.

Impacts of feminization of agriculture on women

Feminization has led to work overload, shortage of time for child raising, mental health issues, recognition and ownership issues

Challenges faced by women farmers

The challenges faced by women farmers are: Lack of ownership of land, lack of access to financial credit, lack of access to resources and modern inputs (most farm machinery is difficult for women to operate) and increased work burden (on-farm and off-farm productive activities) with lower compensation

Empowerment can play vital role:

Empowerment is a process by which oppressed/ underprivileged persons gain control over their own lives. It helps them to get basic necessities of life. This process gives the person strength, self-confidence, increases self-esteem and provides courage to fight against injustice. Empowerment means to have the power to make choices. Such power comes from increasing freedom and capability.

There are five dimensions to gender inequality in agriculture: land rights, productive resources, unpaid work, employment and decision making (Sexsmith, 2017). In order to overcome inequality and to increase efficiency of women, extension of Women-led-technologies, is need of the hour.

Government initiatives for women empowerment

- Door to Dignity: Pradhan Mantri Awas Yojana
- Ensuring Smoke-Free Homes: Pradhan Mantri Ujjwala Yojana
- Protecting Women's Dignity: Swachh Bharat Mission
- Drinking Water at the Doorstep: Jal Jeevan Mission
- Empowering Women Entrepreneurs: Stand-Up India and PM MUDRA Yojana

- Giving Wings to Girl Child: Beti Bachao Beti Padhao
- Fighting Malnutrition: POSHAN Abhiyaan
- Providing Security to Muslim Women: Abolishment of Triple Talaq
- Supporting Motherhood: Pradhan Mantri Matru Vandana Yojana
- Suvidha at 1: Pradhan Mantri Bhartiya Janaushadhi Pariyojana
- Securing Future of Girl Child: Sukanya Samriddhi Yojana

The approach to move forward

1. **Social Security:** A social security blanket is essential to ensure that women have a robust support system to juggle household responsibilities, child-rearing, and financial burdens while also managing work.
2. **Farm Ownership to Women:** There continues to be a growing need to identify women as farmers, with farm ownership that would in turn make them eligible for schemes and benefits, and not mere cultivators who work on farms. According to the agricultural census (2015-16), of the 73.2% of rural women engaged in farming, only 12.8% own land.
3. **Recognize Women's Contribution:** Inclusive approaches in agricultural policy implementation are required to recognize the presence and contribution of women in the sector. In addition, better extension services and training programmes aimed at women can address gender disparity.
4. **Gender Budgeting:** Gender sensitive formulation of legislation, programmes and schemes, allocation of resources can be a powerful tool for achieving gender mainstreaming so as to ensure that benefits of development reach women as much as men.
5. **Gender friendly technology:** the extension of gender friendly technology developed by ICAR and other agencies could play vital role in empowering women by drudgery reduction.
6. **Inclusion of Local Womens at Planning Stage:** Mainstreaming women's role in India's agriculture sector, upcoming developmental projects and action plans should include women in its planning stages. Women working in farms are more aware of their village's geography and land topography and it can also introduce an equity and inclusivity lens to planning.

Conclusion

India listed "women-led development" as one of six main priorities of its G20. Under women-led development, women will not just be beneficiaries of development, instead, they set the agenda for development and are key to achieving the 2030 Goals, as leaders and equal participants. Gender commitments in the G20 have mainly emphasised increasing female labour force participation and improving workplace conditions and earnings for women. India has also committed to launching an online platform for mentoring and capacity-building of women in G20 countries with a focus on women in MSMEs and grassroots leaders. Empower under the Indian presidency launched a Digital Inclusion Platform for women, Tec equality, an aggregator for learning and skilling that brings together technical training and core skill development along with content on digital and financial education. Comprising approximately 50% of the population, increased exposure would increase economic opportunities, which would ultimately push our growth rate by 4.2%, as asserted by the United Nations and ILO. Enhanced representation would surely help to break the glass ceiling which perpetuates regardless of the class lines.

References

https://vikaspedia.in/agriculture/women-and-agriculture/tools-and-equipments-to-reduce-women-drudgery

Khadka, S (2022) Feminisation Of Agriculture: Women In Farming Must Be Backed By Legal And Social Infrastructure. https://feminisminindia.com/2022/07/04/feminisation-of-agriculture-women-in-farming-must-be-backed-by-legal-and-social-infrastructure/#:~:text=This%20means%20that%20the%20Indian,information%20at%20a%20quick%20rate.

NSS Report no. 465: Participation of Indian women in household work and specified activities,1999-2000. NSS 55th ROUND

TOI (2023), India's long road to building a gender equal future.

LP 5.1

Role of Krishi Vigyan Kendra in strengthening transfer of technology

Meenu Maheswaran[1], R.D.Pandya[2], Rose Mathews[3]

[1]Assistant Professor, Department of Agricultural Extension Education, College of Agriculture, Padannakad, Kerala Agricultural University, Kerala

[2]Retd. Principal and Dean, NMCA, Navsari Agricultural University, Navsari, Gujarat

[3]Ph. D. Scholar, Department of Agricultural Extension Education, College of Agriculture, Thrissur, Kerala Agricultural University, Kerala

Email: meenumaheswaran62@gmail.com

Introduction

KVK, the Farm Science Centre, launched in 1974 as a vocational training institution for farmers and field-level extension functionaries. It is an integral part of the National Agricultural Research System, meant for assessment of location specific technology modules in agriculture and allied sectors, via technology assessment, refinement and demonstrations. KVKs functions as Knowledge and Resource Centre of agricultural technology supporting initiatives of public, private and voluntary sector for developing the agricultural economy of the district. The concept of imparting vocational training to farmers and field-level extension workers evolved through KVK due to the increased demand of improved agricultural technologies by the farmers. Krishi Vigyan Kendras (Farm Science Centers), increased its effectiveness by on-farm testing and front-line demonstrations on major agricultural technologies.

Genesis

The research and development along with extension agencies creates a network of Research-Extension system which also known as Agricultural Knowledge Information System (AKIS). With research, education, extension, and farmers at its core, AKIS is referred to as a knowledge triangle. For the effective transfer of technologies from research stations to farmers' fields and to boost up the National Agricultural Research Extension System (NARES)., ICAR has started several programmes in the country such as National Demonstration Project, Lab to Land Programme, Operational Research Project and Krishi Vigyan Kendras (Farm Science Centers). The programmes were reviewed from time to time and restructured for their effectiveness. Currently the Krishi Vigyan Kendras (KVKs) have been recognized as an effective link between agricultural research and extension system in the country (Venkatasubramanian *et. al*., 2009).

As per the recommendation of the Education Commission (1964-66), discussion by the Planning commission and Inter-Ministerial Committee, and by the recommendation of committee chaired by Dr. Mohan Singh Mehta appointed by ICAR in 1973 the idea of establishment of Farm Science Centre (Krishi Vigyan Kendra). The first KVK was established in 1974 at Puducherry under the administrative control of the Tamil Nadu Agricultural University, Coimbatore. Planning Commission approved the proposal of the ICAR to establish 18 KVKs during the Fifth Five Year Plan. With the increased demand, 12 more KVKs were approved by the Governing Body (GB) of the Council in 1979. During Independence Day Speech on 15th August,2005 the Hon'ble Prime Minister of India announced that there should be one KVK in each of the rural districts of the country by the end of 2007. Thus KVKs increased to 551 at the end of Tenth Plan which include 371 under State Agricultural Universities (SAU) and Central Agricultural University (CAU), 40 under ICAR Institute, 88 under NGOs, 33 under State Governments, 3 under PSUs and the remaining 16 under other educational institutions. (https://krishi.icar.gov.in/kvk.jsp)

Funding

The KVK scheme is 100% financed by Govt. of India and the KVKs are sanctioned to Agricultural Universities, ICAR institutes, related Government Departments and Non- Government Organizations (NGOs) working in Agriculture.

KVK System: Mandate and Activities

The mandate of KVK is Technology Assessment and Demonstration for its Application and Capacity Development.

To implement the mandate effectively, the following activities are envisaged for each KVK

1. On-farm testing to assess the location specificity of agricultural technologies
2. Frontline demonstrations to establish genetic production potentiality of technologies on the farmers' fields.
3. Capacity building of farmers and extension personnel to update their knowledge and skills on modern agricultural technologies.
4. To work as Knowledge and Resource Centre of agricultural technologies for supporting initiatives of public, private and voluntary sector in enhancing the agricultural economy of the district.
5. Produce and make available technological products like seed, planting material, bio- agents, young ones of livestock etc. to the farmers
6. Organize extension activities to create awareness regarding improved agricultural technologies to facilitate fast diffusion and adoption of technologies in agriculture and allied sectors.
7. Provide farm advisories using ICT and other media means on varied subjects of interest to farmers

In addition, KVKs produce quality technological products (seed, planting material, bio-agents, livestock) and make it available to farmers, organize frontline extension activities, identify and document selected farm innovations and converge with ongoing schemes and programs within the mandate of KVK.

The KVKs have witnessed several changes in their functions over the years. Accordingly their functional definition also has radically got refined so as to meet the new challenges in agriculture.

KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situations in a district (Das, 2007).

It should be clearly understood that transfer of technology is not a primary function of KVKs and the same is the responsibility of State departments. The KVKs on the other hand will assess (and if needed refine also) the newly released technologies, demonstrate the proven ones and train farmers and extension workers of the district on the same.

Operational modalities of KVK

(I) Identifying farming systems, field problems and developing action plans:

For designing action plan with intervention plans like OFTs, FLDs and training programmes, it is imperative for KVK scientists to identify the grass root level problems existing in the villages of the district. So, a broad analysis of farming system, agro-ecological situation are required to reach out to the needy people with demand based solution to their problems. In order to find out the actual problems, gaps in technology adoption and training needs of farmers, KVK develops a Strategic Research Extension Plan (SREP) through Participatory methodologies such as PRA/RRA by participating all the stakeholders and farmers for the district. SREP also prioritizes the research-extension strategies within the district in convergence with ATMA. After analyzing the farming system and problem, action plan developed and refined by Scientific Advisory Committee (SAC) meeting with proposed interventions by KVK is prepared to address the farming problems and aspiration of the stakeholders in the district.

(II) Technology assessment and refinement:

Agricultural Technology includes both the entities, both material / tangible (such as seeds, fertilizer, pesticides) and immaterial/intangible (knowledge, skill), created by the application of mental and physical effort in order to achieve some value [Swanson and Claar, 1984]. Technology Development or technology innovation is a continuous process involving all the decisions and activities of scientist recognizing a need/problem with planning, testing, conducting research, verification, testing and dissemination for adoption. KVKs plays a pivotal role in testing, adaptation and integration of proven technologies. Participatory Bottom-up approach to refine technologies for better adaptability and improved performance in local situation with Key emphasis on sustainability, profitability and productivity. Agro-climatic suitability ,operational feasibility; eco-viability; socio-cultural compatibility were the refinement criteria based on which technology refinement is accomplished.

The starting point of technology development process is technology generation, which is mainly the

function of Research System, whereas testing, adaptation and integration stages consist TAR (Technology Assessment and Refinement). TAR is implemented by On Farm Trial of KVK System. further refinement or validation of technology in TAR, feedback during this process is passed over to Research System. Successful OFTs is transferred to Extension System as feed forward for mass popularization at the district level. The final stage Technology adoption which is achieved by the client system i.e. farmers.

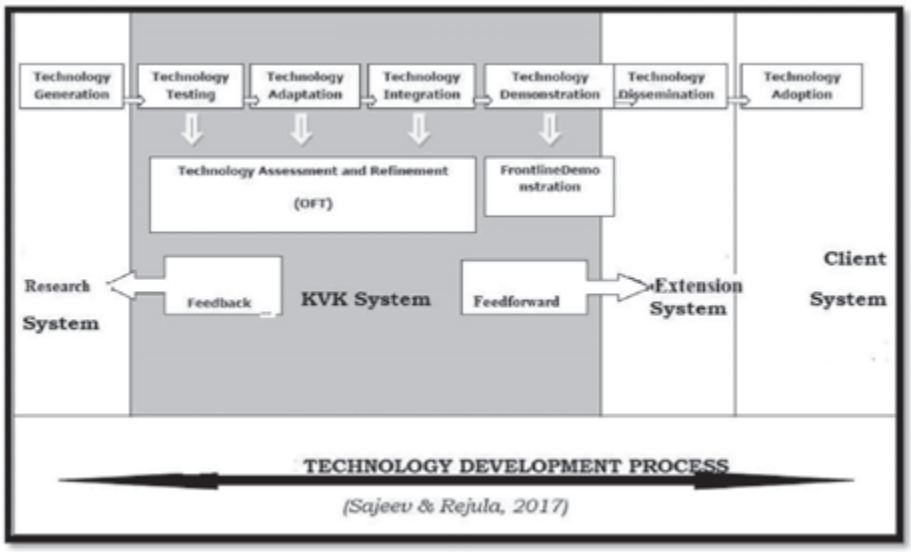


Fig 1: Conceptual model of technology generation process

ICAR institutes, SAUs, DBT,DST, Commodity boards, NGOs, private corporate and farmers' innovators whereas extension system consisting of state department of Agriculture, Animal Husbandry, Extension wings of ICAR and SAUs such as Directorate of Extension and NGOs; private players were included in the Research System which is responsible for technology generation.

The relevance of KVK is due to bridging gap of both the research and extension system where majority of technology development stages pass through TAR, thus acting as both feedback and feed forward mechanism in the system. KVK assess and refine the technologies, but farmers and micro farming situation also acts as ultimate decisive role makers in technology adoption or rejection. Thus, participatory technology development has important role in achieving need based solution to them by active participation of themselves in TDP.

TAR is a set of procedures to develop recommended technological practices for a particular agro-climatic situation through assessment and refinement of new released technologies by the active participation of farmers on farmer's plot. TAR should be interdisciplinary, holistic, site specific, problem oriented, farmer-scientist linkage based on sufficient understanding of micro farming situation and farmer's aspiration (Venkatasubramanian *et. al*., 2009).

(III) On-farm testing (OFT):

Testing of any improved technology along with the farmers practice in the field with active participation of both the scientists and farmers is known as OFT.

In this, two to three improved varieties or improved technologies are tested in the same field so as to compare the results of these treatments. As per farmers' suggestions as well as local soil and climatic conditions, scientists of KVK may slightly modify improved technology to get maximum return.

(IV) Frontline demonstrations (FLD):

Field Proven technologies are exhibited in farmers' fields under the strict supervision of scientists since the technologies are first demonstrated by the scientists themselves before being incorporated into the primary extension system of the state department of agriculture in that particular location.

A block of two to four hectares in the farmer's field is used in this strategy to implement recently released crop production and protection technologies as well as their management practices. Only essential components and instruction are supplied for this demonstration by Krishi Vigyan Kendra. Farmers and

extension agents are both the intended audience for FLD. Data on factors influencing higher output as well as production limitations in various agricultural circumstances can be generated using the FLD.

From the FLD, it is possible to generate some data related to factors contributing to higher yield and also constraints of production under various farming situations. It is conducted in a particular locality after extensive discussion and consultation with the farmers. Highly efficient new proven technology with higher potentialities is selected for this programme depending upon the requirement of that area. A field day is conducted in the demonstration field when the crop is at maturity stage and interaction between the scientists, farmers and extension functionaries takes place in the field. The crop is harvested in the presence of the interested group of farmers so that they can visualize-the importance of new technology easily and effectively.

Types of FLD: There are two types of FLD such as

'1. **Single practice FLD'** – It verifies the effect of single practice in outcome (e.g. effect of green manuring application in rice crop)
2. **Composite FLD'** – It is a combination of MD and RD in which MD conducted in different components of technological package for getting effective outcome in Result Demonstration (eg. effect of green manuring, bio fertiliser application, bio pesticide application etc. in rice crop).

(V) Capacity building:

Capacity building is an important and emerging domain in current situation staring from vocational training since inception of KVK in 1974. As main mandate of KVK is to raise capacity of clients i.e. farmers and extension professionals, Capacity building involves the conduction of training focusing only providing specific skills and knowledge for performing a particular task solving specific problems. According to UNDP, capacity building is a long term continuous collaborative process involving all stakeholders' participation for human resource development of individuals and organizational development. Learning by doing, experiential Learning, mentoring etc. are the several methods of capacity building.

Lynton and Pareek defined training consists largely of well organized opportunities for participants to acquire necessary understanding and skill. There are mainly five categories of training conducted at on campus (KVK premises) or off campus (Farmers field, other line department office premises etc.) such as

i) Farmers and Farm Women
ii) Rural Youth (15-35 age groups)
iii) Extension professionals (line department officers such as AAO, AHO and grass loot level extension functionaries such as Village Agricultural Workers)
iv) Sponsored training programmes – meant for farmers, rural youth and extension personnel
iv) Vocational training programmes – meant for farmers and rural youth

Other modalities of KVK

- There are also activities of content creation or documentation of any technological practices by help of digital media or ICT to store, archive, share, and use it in future as and when required in the district.
- An e-extension approach of KVK Kissan Mobile Advisory Services (KMAS), is a Govt. of India initiative which is text message sending platform from each KVK to its registered large number farmers of district at crucial time of crop production regarding specific operation along with weather alert messages.
- Krishi vigyan Knowledge Network is developed through KVK portal.
- A Knowledge centre was also introduced
- KVK acts as Single Window System in supplying products such as quality seeds, seedlings, live species of livestock, fingerlings of fish, mushroom spawn, value added products, vermi compost, organic bio-fertilisers, waste decomposers, bio-pesticides etc.
- It also act as agri-clinic and agro advisory centre for the clients of the district for inter disciplinary team solving farmers problems providing scientific recommendation according to their micro-farming situation.
- KVK provides infrastructural facilities for soil and water testing lab where any farmer can test and get the status instantly.

- KVK also maintains crop cafeteria, live demo units, exhibits of agro machineries of emerging technologies for outsiders, visitors and farmers to get inspired for adoption of the same.

Recent schemes of ICAR carried out through KVK

- ICAR has initiated ARYA (Attracting and Retaining Youth towards Agriculture) in 2015-16 realizing the significance of 43% rural youth in India by attracting them under the age of 35 years by experimenting in 25 states one KVK out of each state targeting 200-300 youths in initial phase to impart agricultural and allied skills and enabling them to explore income generating opportunities being engaged in agricultural enterprise.
- National Food Security Mission is a flagship program of Govt. of India promote pulse and oilseed production program to achieve food and nutritional security with ICAR for Seed hub project empowering farmers in seed production in indigenous pulse and oilseed by the help of KVK for technical support.
- The CFLD (cluster front line demonstration) for pulse and oilseed to promote pulse and oilseed production among farmers and enhance crop diversity in rainfed areas under the supervision of KVK scientists.
- ICAR through Tribal Sub Plan address the issue of social and economic marginalized backwardness in tribal area through specialized to improve their livelihood and integrate in the mainstream by specialized subsidy for agri-startup.

Conclusion

Within the limited perspective, farmers' capacity building is often seen of giving them the knowledge and skills required to practice crop and animal husbandry practices in a better way. Although, knowledge and skills are fundamental to efficiency in any enterprise, the Indian farmers need more than that because of the limitations and complexities under which they operate in their situation. The KVKs which have been mandated to work with farmers, farm workers and rural youth directly as well as through field extension functionaries have the greatest challenge to make their clients more efficient, specialized and to be economically active and to focus more on knowledge-based technologies to upgrade and improve the skills of the farmers. The fact that the need for agricultural and allied sectors and rural information and advisory services is to intensify in the immediate future exerts more pressure on KVK performance to satisfy changing needs of farmers. This paper has attempted to provide a conceptual paradigm regarding KVK's mandates and important functions and activities. This paper also illustrates importance of KVK as knowledge resource centre in agriculture for a district and being a torch bearer in leading line department and other stakeholders to equip themselves for the future challenges addressed by them.

References

Alok Kumar Sahoo (2021). The Role Of Krishi Vigyan Kendras (KVK) In Strengthening National Agricultural Research Extension System In India. *Insights Into Economics And Management*, 8.

Das, P., (2007). As Quoted From: =Proceedings Of The *Meeting Of DDG (AE), ICAR, With Officials Of State Departments, ICAR Institutes And Agricultural Universities*, NRC Mithun, Jharnapani On 5th October 2007,' Zonal Coordinating Unit, Zone – III, Barapani, Meghalaya, India.

Indian Council Of Agricultural Research. Retrived From Https://Krishi.Icar.Gov.In/Kvk.Jsp.

Lynton RP, Pareek U. *Training For Development*. Vistaar Publications: New Delhi; 1990.

Sajeev. M.V. & V. Venkatasubramanian (2010). Technology Application Through Krishi Vigyan Kendras: Conceptual Paradigm, *International Journal Of Extension Education*, INSEE, Nagpur.Vol.6:45-54.

Sajeev. M.V. And K. Rejula. (2017). *Recent Trends In Harvest And Post-Harvest Technologies In Fisheries*. Central Institute Of Fisheries Technology, Kochi, India.

Swanson, B. E. and Claar, J. B. (1984). The history and development of agricultural extension. In: Swanson B.E. (Ed). Agricultural Extension: A Reference Manual, FAO, Rome.

Venkatasubramanian, V., Sanjeev, M.V, Singha, A. K. And De Alwis, A. (2009). *Concepts, Approaches And Methodologies For Technology Application And Transfer: A Resource Book For Kvks*. Zonal Project Directorate, Zone-III, ICAR.

LP 5.2

Innovative models of technology transfer in the agriculture sector of India

Neeta Khandelwal
Assistant Professor, Dept. of EECM, ACN&CS,SDAU Gujarat
Email: neeta.udr@sdau.edu.in

Introduction

Established methods and practices were used to share and disseminate technology, knowledge, or innovations from one entity or organization to another. These approaches have been in place for many years, forming the foundation for technology transfer activities. These approaches included publication and documentation, academic research and collaboration, conferences and seminars, consulting and expert services, patents and licensing,government R&D grants, collaborative R&D projects, technology transfer offices, trade shows and exhibitions, apprenticeships and on-the-job training, technical assistance programs,supplier relationships, and peer-to-peer networks.

However, in the 21st century, with the advent of modern information and communication technology, high-speed internet and social media, the approaches have taken different routes altogether. Innovative models of technology transfer have emerged over the years to facilitate the efficient and effective transfer of technology.

Basic model of technology transfer

The basic model of technology transfer, as proposed by Richard C. Haines in 2010, typically consists of several key stages or components. This model is a simplified representation of the process involved in transferring technology from one entity to another. Here are the basic stages of technology transfer:

1. **Identification of technology needs**:
- The process begins with identifying the specific technology needs or requirements of the recipient organization or individual. This could involve assessing existing challenges or gaps that technology can address.
2. **Technology sourcing**:
- Once the technology needs are identified, the next step is to source or identify the appropriate technology solution. This may involve searching for available technologies, products, or expertise either internally or externally.
3. **Technology assessment**:
- Before transferring the technology, it's crucial to assess its suitability and compatibility with the recipient's requirements. This assessment involves evaluating the technology's functionality, cost-effectiveness, and potential benefits.
4. **Negotiation and agreement**:
- Negotiations take place between the technology provider and the recipient. This stage includes discussions on terms and conditions, licensing agreements, intellectual property rights, and any financial considerations.
5. **Technology transfer**:
- This is the core stage where the actual transfer of technology occurs. It involves the transmission of knowledge, expertise, and physical assets (if applicable) from the provider to the recipient. Training and capacity-building may also be part of this stage.
6. **Adaptation and integration**:
- The recipient organization or individual adapts and integrates the transferred technology into their existing processes or systems. This often requires customizing the technology to suit their specific needs.

7. **Testing and validation**:
- Before full-scale implementation, the transferred technology is typically tested and validated to ensure it functions as expected and delivers the intended benefits.

8. **Scaling and deployment**:
- Once the technology is validated, it can be scaled up and deployed for broader use. This may involve gradual implementation across different departments or locations.

9. **Monitoring and evaluation**:
- Continuous monitoring and evaluation are essential to assess the technology's performance, address any issues, and make necessary improvements.

10. **Knowledge transfer and training**:
- Throughout the process, knowledge transfer and training play a crucial role. The recipient organization or individuals must acquire the skills and knowledge required to effectively use and maintain the technology.

11. **Maintenance and support**:
- Ongoing maintenance and technical support are provided to ensure the technology's long-term sustainability and effectiveness.

12. **Feedback and improvement**:
- Feedback from users and stakeholders is collected and used to make iterative improvements to the technology and the transfer process itself.

13. **Sustainability and knowledge management**:
- Strategies are put in place to ensure the long-term sustainability of the technology and the management of knowledge related to its use.

This basic model of technology transfer provides a structured framework for the systematic transfer of technology from one entity to another, whether it's between organizations, from research institutions to industry, or from developed countries to developing countries.

Innovative models of technology transfer

Innovative models of technology transfer involve the sharing, dissemination, and adoption of technology, knowledge, or innovations from one entity to another, with the aim of fostering economic growth, innovation, and societal development. These models go beyond traditional approaches and leverage modern strategies and technologies to facilitate efficient and effective technology transfer.

The prominent innovative models of technology transfer are:

- **Open innovation:** This model promotes collaboration between organizations, allowing them to share and exchange technology and knowledge with external partners, such as universities, research institutions, startups, and even competitors. Open innovation encourages the flow of ideas and technologies across boundaries, fostering creativity and accelerating technology transfer.
- **Technology licensing and royalties:** Many technology transfer agreements involve licensing intellectual property rights to other organizations in exchange for royalties or fees. This model enables organizations to monetize their technology while allowing others to use it for specific purposes. It can be a win-win arrangement when both parties benefit.
- **Incubators and accelerators:** These programs provide startups and entrepreneurs with access to technology, expertise, and resources from established organizations. In return, the startup may offer equity, royalties, or a share in future profits. Incubators and accelerators facilitate the rapid development and transfer of technology from research institutions to the market.
- **Joint ventures and strategic alliances:** Collaborative partnerships between organizations can be formed to develop and commercialize technology jointly. These ventures often involve sharing

resources, risks, and rewards, making it a beneficial model for technology transfer when both parties have complementary strengths.

- **Technology parks and clusters:** Establishing technology parks or clusters brings together research institutions, businesses, and startups in a physical location. This proximity fosters collaboration, knowledge sharing, and technology transfer within a concentrated ecosystem.
- **Open source and creative commons:** Open source software and Creative Commons licensing allow for the open sharing of technology, code, and content. This model promotes innovation through community collaboration and enables widespread adoption of technologies without traditional barriers.
- **Technology scouts and brokers:** Organizations often employ technology scouts or brokers to identify promising technologies and negotiate technology transfer agreements on their behalf. These intermediaries play a crucial role in connecting technology providers with potential users or licensees.
- **Government initiatives and grants:** Governments often fund research and development efforts and offer grants or incentives to promote technology transfer. These initiatives can encourage academia, research institutions, and private companies to collaborate and share their technologies with broader society.
- **Crowdsourcing and crowdfunding:** Platforms that leverage the power of the crowd can be used to source funding and ideas for technology development and transfer. Crowdsourcing allows a wide range of contributors to participate in innovation processes.
- **Blockchain and smart contracts:**Blockchain technology can be used to create transparent and secure records of technology ownership and transactions. Smart contracts can automate the transfer of technology and royalties based on predefined conditions.
- **Tech transfer offices:** Many universities and research institutions have dedicated technology transfer offices (TTOs) that facilitate the transfer of innovations from academia to the commercial sector. TTOs play a critical role in negotiating licenses, patents, and collaborations.
- **Technology marketplaces:** Online marketplaces and platforms specialize in connecting technology providers with potential buyers or licensees. These platforms make it easier for organizations to showcase their technologies and find interested parties.

Innovative models of technology transfer continue to evolve with advancements in technology and changes in the business landscape. Effective technology transfer plays a crucial role in driving innovation, economic growth, and societal progress.

Innovative models of technology transfer in the agriculture sector

Similar to other sectors, innovative technology transfer models are equally essential in the agriculture sector for improving productivity, sustainability, and resilience. These models facilitate the dissemination of agricultural innovations, practices, and technologies to farmers, agricultural businesses, and stakeholders. Here are some innovative models of technology transfer in agriculture:

Digital agriculture platforms:

- **Mobile Apps:** Mobile applications provide farmers with real-time access to agricultural information, weather forecasts, pest and disease management, and market prices.
- **Agricultural Information Portals:** Online portals and websites offer a wealth of agricultural knowledge, including best practices, research findings, and market trends.
- **Precision Agriculture:** Promote precision agriculture techniques by using technology-driven approaches like GPS-guided tractors drones and sensors.These technologies can collect data on soil health, moisture levels and crop growth, allowing farmers to make informed decisions.

AgTech incubators and accelerators:

- These programs support developing and transferring agricultural technologies, especially those related to automation, sensors, data analytics, and robotics.

- Startups and innovators in agriculture receive mentorship, funding, and access to industry experts through these initiatives.

Farmer-to-farmer knowledge sharing:

- Facilitating knowledge exchange among farmers through farmer field schools, farmer cooperatives, whats-up group or community radio.
- Seasoned farmers teach their peers about sustainable and innovative agricultural practices.

Demonstration farms and learning centers:

- Establishing demonstration farms and agricultural learning centres to showcase best practices and innovative technologies.
- Farmers can visit these sites to see firsthand how new methods and technologies work in practice.

Agricultural hackathons and challenges:

- Organizing events that bring together farmers, tech enthusiasts, and experts to brainstorm and develop solutions to specific agricultural challenges.
- These events encourage innovation and foster collaboration.

Public-Private Partnerships (PPP):

- Collaborations between governments, private companies, and non-profit organizations to transfer technologies, improve infrastructure, and provide training to farmers.
- PPPs often focus on critical areas such as irrigation, seed development, and market access.

Blockchain for supply chain traceability:

- Implementing blockchain technology to enhance transparency and traceability in the agricultural supply chain.
- This allows consumers to trace the origin and quality of agricultural products, fostering trust.

Agricultural extension services:

- Leveraging modern communication channels like SMS, IVR (Interactive Voice Response), and online platforms to provide agricultural extension services.
- These services deliver advice, training, and information to farmers, even in remote areas.

Climate-smart agriculture initiatives:

- Introducing climate-smart agriculture practices that help farmers adapt to changing climate conditions.
- Technologies such as drought-resistant crops and water-efficient irrigation systems play a role in these initiatives.

Rural agribusiness incubators:

- Supporting rural entrepreneurship by establishing agribusiness incubators that provide training, access to resources, and market linkages to small-scale farmers and agribusiness startups.

Open data and data-sharing platforms:

- Creating platforms that allow farmers to share agricultural data, such as weather observations and soil quality information.
- This data can inform decision-making and improve agricultural practices.

Community-based seed banks:

- Community-led initiatives for preserving and sharing traditional and climate-resilient crop varieties.
- These seed banks ensure access to diverse and adapted seeds.

In the agriculture sector, the effective transfer of technology and knowledge is critical for increasing food production, reducing environmental impact, and enhancing the livelihoods of farmers. Innovative models of technology transfer help bridge the gap between research and practical application in agriculture.

Innovative models of technology transfer in the Indian agriculture sector

In India, the agriculture sector is of paramount importance, and innovative models of technology transfer are crucial for addressing the unique challenges faced by Indian farmers. Here are some innovative models of technology transfer in the agriculture sector specific to India:

Krishi Vigyan Kendras (KVKs):

- KVKs are agricultural extension centres established by the Indian Council of Agricultural Research (ICAR) across India. They play a pivotal role in disseminating agricultural technologies and knowledge to farmers.
- KVKs conduct on-farm trials, demonstrations, and training programs to educate farmers about modern agricultural practices.

M-Kisan app:

- Developed by the Indian government, the M-Kisan mobile app provides farmers with personalized information on crop advisories, weather forecasts, market prices, and government schemes.
- It enables farmers to make informed decisions and improve their agricultural practices.

Digital agriculture platforms:

- Several startups and organizations in India have developed digital platforms and apps tailored to Indian agriculture, such as AgriBazaar, AgriApp, and AgroStar.
- These platforms offer services like e-commerce for farm inputs, crop monitoring, pest and disease identification, and market access.

E-NAM (National Agriculture Market):

- E-NAM is an online trading platform that connects agricultural produce markets across India. It enables farmers to sell their products to buyers across the country.
- This initiative promotes transparency and fair pricing in agricultural markets.

Agricultural Technology Management Agency (ATMA):

- ATMA is a government program at the district level that promotes the dissemination of agricultural technologies.
- It facilitates the convergence of various agricultural development programs and coordinates technology transfer activities.

Farmers' Producer Organizations (FPOs):

- FPOs are collective entities formed by groups of farmers to improve their bargaining power and access resources.
- They often work with agricultural experts and organizations to transfer technology and modern farming practices to their members.

Precision agriculture and IoT solutions:

- Precision agriculture technologies, such as soil sensors, drones, and automated irrigation systems, are being adopted in India to optimize resource use and increase yields.
- IoT-based solutions help farmers monitor and manage their farms more efficiently.

Agri-startups and incubators:

- India has seen a surge in agri-startups that develop and transfer innovative agricultural technologies.
- Incubators and accelerators, like Agri-Tech Incubators, provide support and mentorship to these startups.

Government-private sector partnerships:

- Public-private partnerships (PPPs) significantly influence technology transfer in India's agriculture sector. Collaborations between government agencies and private companies aim to provide farmers with improved seeds, crop protection products, and best practices.

Satellite-based services:

- The Indian Space Research Organisation (ISRO) provides satellite-based services for agriculture, including remote sensing data for crop monitoring and disaster management.
- These services help farmers make informed decisions about crop management.

Community radio stations:

- Community radio stations in rural areas broadcast agricultural information, advice, and success stories.
- These stations help bridge the information gap and promote knowledge sharing among farmers.

Agricultural credit technology:

- Fintech companies in India are developing innovative solutions to provide easy access to credit for farmers based on their digital footprint and crop data.

In India, technology transfer in agriculture is essential for increasing farm productivity, reducing post-harvest losses, and improving the livelihoods of millions of small and marginal farmers. These innovative models help ensure that cutting-edge agricultural technologies and knowledge reach the grassroots level, significantly impacting Indian agriculture.

Innovative models of technology transfer: Revolutionizing agriculture

In the fast-evolving agricultural sector, adopting innovative technology transfer models holds immense promise for transformation. These models transcend conventional methods, leveraging modern strategies and technologies to deliver a spectrum of benefits to farmers, rural communities, and the agriculture industry at large.

First and foremost, these models fuel agricultural productivity. They enable higher crop yields and improved resource management by granting farmers access to cutting-edge technologies, knowledge, and sustainable practices. It not only boosts individual livelihoods but also contributes significantly to food security on a global scale.

Furthermore, innovative technology transfer models promote environmental sustainability. They reduce the ecological footprint of farming activities through precision agriculture, organic farming, and efficient resource management. It is crucial for mitigating the adverse effects of climate change and ensuring the long-term viability of agricultural practices.

Another significant advantage lies in economic development. By encouraging entrepreneurship, agribusiness startups, and rural initiatives, these models create employment opportunities, alleviate poverty, and invigorate rural economies.

Moreover, technology transfer fosters resilience in the face of climate change. Access to climate-smart technologies, early warning systems, and adaptive practices empowers farmers to weather environmental challenges and safeguard their livelihoods.

Innovative models of technology transfer: Limitations

While innovative technology transfer models hold immense promise for the agriculture sector but face several limitations, access to these models can be unequal, leaving smallholder farmers and marginalized communities disadvantaged. The digital divide and limited infrastructure in remote areas hinder technology adoption. Moreover, the cost of acquiring and implementing advanced technologies can be prohibitive for many farmers. Cultural and educational barriers may impede the adoption of new practices. Additionally, technology transfer models must consider the context-specific needs of diverse agricultural regions, which can pose challenges for scalability. Overreliance on technology may also neglect traditional wisdom and practices that have sustained agriculture for generations. Addressing these limitations is crucial to ensure equitable and inclusive technology transfer in agriculture.

Conclusion

In conclusion, innovative technology transfer models are catalysts for a more prosperous, sustainable, and resilient agriculture sector. They not only empower farmers with the tools to thrive but also contribute to

global food security and environmental conservation. Embracing these models is not just a choice; it is an imperative for the future of agriculture.

In the Indian agriculture sector, innovative technology transfer models offer a transformative path forward. These models bolster agricultural productivity by introducing cutting-edge technologies, data-driven solutions, and sustainable practices. It leads to increased crop yields, reduced resource wastage, and improved incomes for farmers. Furthermore, innovative technology transfer fosters resilience against climate change, equipping farmers with tools to mitigate risks. It also fuels economic growth by nurturing rural entrepreneurship and generating employment opportunities. In a country where agriculture is a linchpin of the economy and a source of livelihood for millions, embracing these models is critical to ensuring food security, sustainable practices, and rural prosperity.

References

Aker, J. C. (2011). Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries. Agricultural economics, 42(6), 631-647.

Kalam, A. P. J. A., & Singh, S. P. (2011). Target 3 billion: PURA: Innovative solutions towards sustainable development. Penguin Books India.

Mehta, S. (2020). Book review: Lakhwinder Singh and Anita Gill (Eds.). 2020. Agriculture Innovation Systems in Asia: Towards Inclusive Rural Development.

Singh, K., &Misra, M. (2021). Developing an agricultural entrepreneur inclination model for sustainable agriculture by integrating expert mining and ISM–MICMAC. Environment, Development and Sustainability, 23, 5122-5150.

Singh, L., & Gill, A. (2019). Agriculture innovation system for inclusive rural development in Asia: An introduction. In Agriculture Innovation Systems in Asia (pp. 1-17). Routledge India.

Singh, L., & Gill, A. (Eds.). (2019). Agriculture innovation systems in Asia: towards inclusive rural development. Taylor & Francis.

Tripathi, A., Jain, A., Singh, A. K., Choudhary, P., Mishra, K. K., &Vashist, P. C. (2022). The Internet of Things in agriculture for sustainable rural development. In AI, Edge and IoT-based Smart Agriculture (pp. 157-170). Academic Press.

LP 5.3

Drudgery reducing technologies and their acceptability

Surabhi Singh[1] and D. B. Patel[2]

[1]ASPEE College of Nutrition and Community Science, SDAU

[2] Associate Director of Extension, S. D. Agricultural University, Sardarkrushinagar-385506

Introduction

Rural Indian women are extensively involved in agricultural activities. However, the nature and extent of their involvement differs with the variations in agro production systems. The mode of female participation in agricultural production varies with the landowning status of farm households. Their roles range from managers to landless labourers. Rural women are torchbearers for social, economic and environment transformation for the 'New India'. In India, Agriculture employs about 80 percent of rural women. Empowering and mainstreaming rural women workforce in agriculture can bring paradigm shift towards economic growth. It will enhance food and nutrition security and alleviate poverty and hunger. It's a win win strategy for achieving Sustainable Development Goals by 2030.

Ergonomical parameters for evaluation of Drudgery

There are numbers of parameters used for evaluation or assessment of drudgery.

2.1 Heart rate:

- Heart rate is one of the most accurate means of studying the energy expenditure, physiological workload while performing any activity.
- More the workload, higher will be the heart rate.
- The heart rate varies from person to person and also varies during resting condition and working state.
- Therefore, resting heart rate of the worker is also recorded before conducting any experiment.
- Difference between working heart rate and resting heart rate gives ? HR (beats/min) or work pulse i.e. increase in heart rate during work over rest.

2.2 Energy expenditure:

- Energy expenditure (kJ/s) = 0.159 x Average heart rate (beats/min) – 8.72
- Cardiac Cost of Work (CCW)
- The cardiac cost of work can be estimated as per formula given by Varghese et al.,(1994).

  CCW= ? HR x duration of activity

  Where ? HR= Average working heart rate-Average resting heart rate

Ergonomic aspects in the design of farm tools and implements

- Bending the tool not the worker,
- Considering the dynamicity of human beings,
- Holding methods,
- Modes of operation (sitting or standing),
- Providing minimum static muscular effort to the workers,
- Considering 30 per cent of strength of 5 th percentile user (women),
- Considering 95th percentile of related anthropometric data of workers (users) for space to an object with some allowances,
- Considering not more than 30 per cent of weight of 5th percentile workers (users) for pulled/pushed farm equipment or requiring manually transportation, considering safety aspects etc.
- Anthropometry (dimensional), muscular strength, aerobic capacity, posture, load carrying capabilities, safety issues, physiological cost of operation and other factors are important from ergonomic point of view in designing farm tools and equipment.

3.1 Anthropometry

- Measurements of different body dimensions are taken as per the need for the design of particular farm equipment. Amongst different body dimensions, the difference in weight and stature of men and women workers are compared as these two parameters provide the majority of dimensional issues.

- Normally 5th to 95th percentile values are taken for design to satisfy 90 per cent user population. 5th percentile data are taken where reach is the requirement while 95th percentile data are taken for the requirement of space.

3.2 Muscular strength

- It is considered that the strength is positively correlated with body weight.
- Strength also varies with age, its maximum value being in the age group of 25-35 years.
- Older workers aged between 50 and 60 years can produce the muscular power of only about 75- 85% of that of the younger group.
- Grandjean (1988) suggests for consideration of 30 per cent of strength values as per the need.

3.3 Aerobic Capacity

- The aerobic capacity, also called as maximal oxygen consumption rate, which sets the limit for maximum physical work capacity of a person.
- For women, this value is generally 75% of that of men.
- As per the data available for Indian workers, this value for men and women workers is about 2.0 litres/min and 1.5 litres/min, respectively.

3.4 Posture

- A good working posture is one which requires a minimum of static muscular effort for better work performance and less body discomfort.
- Any operation in squatting or bending posture involves drudgery, and it is reflected in terms of discomfort experienced by the workers.
- Therefore, as far as possible, such postures should be avoided and only sitting, or standing posture should be used during work.
- Also for long duration work, a sitting posture may be better than the standing posture.

3.5 Load carrying capabilities

- Load carrying and transportation is one of the important activities in agriculture, for example, carrying tools and equipment, manure, FYM, seeds, fertiliser, lifting and transportation of harvested produce and grain, etc.
- The load to be carried by a worker should not exceed 40% of his/her body weight.
- The mode of load carrying should be such that the static loading of hands and arms is avoided.
- However, this limit is applicable for plains only and hilly region, the limit will be less depending on slope and the terrain.

3.6 Safety issues

- Safety can also be defined to be the control of recognised hazards to achieve an acceptable level of risk. This can take the form of being protected or from exposure to a situation that causes health or economical loss.

  For example: Provision of a safety guard over wire loop cylinder may avoid hitting the grain to the face of the workers while threshing paddy crop. Any hole or opening having space more than 1 cm may trap loose cloths. The moving parts and chain drive system must be covered to avoid any miss-happening. The electrical wire must have plug and socket.

3.7 Physiological cost of operation

- Physiological cost of any operation is expressed in terms of heart rate and oxygen consumption rate.
- For an 8 hour work period for women workers, a work load requiring oxygen at a rate of 0.6 l/min is considered as the maximum limit for the acceptable work load.
- The heart rate for such a work load may be about 110 to 120 beats/min.
- Only 30 per cent of the energy produced by oxidation of food appears as useful for mechanical work, the remainder being dissipated in the form of heat.
- The unproductive static effort is another form in which energy is wasted.

Women friendly drudgery reducing technologies

4.1 Groundnut decorticator

- It is a manually operated equipment to separate kernels from groundnut pods.
- The unit consists of frame, handle, oscillating arm sieve with oblong hole.
- The pods are feed in batches of 2 kg and crushed in between concave and oscillating arm having cast iron/ nylon shoe to achieve shelling.
- About 79% saving in cardiac cost of workers per unit of output with the groundnut decorticator as compared to traditional practice.

4.2 Tubular maize sheller

- It is a hand operated tool to shell maize from dehusked cobs.
- The unit consists of galvanized mild steel pipe with four tapered fins riveted to its inner periphery.
- The Sheller is held in left hand, a cob held in right hand inserted into it with forward and backward twist, to achieve the shelling.
- Octagonal designs are also available.

4.3 Fertilizer broadcaster for women

- It is hand operated fertilizer broadcaster for women .It weighs only 3.5 kg. Its tank capacity is 7.5 kg and Swath width is5 m. An area of 1.1 hectare can be broadcasted by it in one hour.

4.4 Hanging type grain cleaner

- It is a simple hanging grain cleaner. Around 225 kg of grain can be cleaned per hour as against the conventional cleaning of 25 kg per hour

4.5 Hand ridger:

It is used for making ridges in field to sow vegetables on ridges. The equipment can also be used for making furrows in field for irrigation.

- The equipment is suitable to be operated by farm women to make ridges and furrows for ridge planted vegetables, sugarcane planting and making field channels for irrigation. It is simple labour saving implement operated by two women for forming small ridges where crops are to be grown under irrigated conditions. It consists of a handle, ridge maker share and t-type pulling beam. Field needs to be well prepared for getting better performance of equipment for making ridges/furrows. The equipment is operated by two women workers, one for pulling and another for pushing and guiding**.**

Drudgery reduction aspect

- About 67% saving in cardiac cost of worker per unit output with the ridger in comparison to the traditional method of making ridges.

4.6 Groundnut stripper

The groundnut stripper consists of a square frame of vertical legs and a horizontal strip of expanded metal fixed on each side of the frame in the form of comb. The stripping of the pods is accomplished by drawing a handful of vines. The structure facilitates its use by four women simultaneously. A small adjustable stool was fabricated for the operator to sit and perform the stripping operation. The height of the stool can be adjusted from 28-40 cm. This design eliminates knee pain and numbness while stripping in sitting posture.

- About 79% saving in cardiac cost of workers per unit of output with the groundnut stripper as compared to conventional practice.
- Squatting posture is avoided which minimizes stress at knee.
- Higher output, i.e. 350 kg of pods/day can be obtained as against 200 kg in case of conventional stripping.

Performance data and ergonomic evaluation of drudgery reducing tools and equipment

Drudgery reducing tools and equipment namely hand ridger, improved sickle, groundnut decorticator and tubular maize sheller were introduced among farm women.

Table 1: Ergonomic Evaluation of Drudgery reducing tools

S. N.	Drudgery reducing tools	Average Resting Heart rate (bpm)	Resting VCO2 (l/min)	Average Working Heart rate (bpm)	Working VCO2 (l/min)	Average Heart rate in tradition al practice	Energy expenditure (KJ/min) in traditional practice	Energy expendit ure (KJ/min) using drudgery reducing tools
1	Hand ridger	92	0.35	139	1.09	155	15.925	13.381
2	Improved Sickle	102	0.32	124	0.70	124	10.996	10.996
3	Groundnut decorticator	92	0.35	116	0.64	92	5.908	9.724
4	Tubular maize sheller	91.6	0.35	97	0.49	93	6.067	6.703

Though, average working heart rate of farm women using improved sickle and conventional sickle was found same. Singh et al. (2014) found that average working heart rate was more while farm women used serrated sickle as compared to local sickle but working efficiency was increased. It was found that average working heart rate of farm women had reduced from 155 beats per min to 139 beats per min, while using hand ridger as compared to traditional practice. It prevented farm women from working in bad posture for making ridges. In traditional method, women have to prepare ridges in a bending position while through hand ridger, two women can prepare ridges of equal distance in standing posture. Women feel less physiological fatigue in standing posture as compared to the bending posture. Average working heart rate of farm women was found more in case of groundnut decorticator and tubular maize sheller as compared to their average working heart rate in traditional practice.

Acceptability level of drudgery reducing technologies

Table 2: Perceived acceptability level of women friendly drudgery reducing technologies

n=60

Sr. No	Parameters of acceptability	Groundnut decorticator		Maize Sheller		Sickle	
		f	%	f	%	f	%
A	**Compatible in use**						
a	Highly compatible	54	90.00	48	80.00	50	83.33
b	Moderately compatible	05	08.33	12	20.00	10	16.67
c	Not compatible	01	01.67	00	00.00	00	00.00
B	**Efficiency in quantitative production**						
a	Highly efficient	56	93.33	46	76.67	51	85.00
b	Moderately efficient	04	06.67	13	21.66	08	13.33
c	Less efficient	00	00.00	01	01.67	01	01.67
C	**Efficiency in qualitative production/harvesting**						
a	Highly efficient	57	95.00	55	91.67	48	80.00
b	Moderately efficient	03	05.00	02	03.33	12	20.00
c	Less efficient	00	00.00	03	05.00	00	00.00

D	**Cost**						
a	Appropriate cost	32	53.33	31	51.67	38	63.33
b	Little bit high cost	17	28.33	14	23.33	19	31.67
c	High cost	11	18.34	15	25.00	03	05.00
E	**Level of drudgery perceived**						
a	Low drudgery prone	51	85.00	42	70.00	39	65.00
b	Moderately drudgery prone	05	08.33	05	08.33	10	16.67
c	Highly drudgery prone	04	06.67	13	21.67	11	18.33
F	**Level of Health hazards**						
a	No chances of injury	58	96.70	57	96.67	55	91.67
b	Somewhat chances of injury	02	03.30	03	05.00	02	03.33
c	High chances of injury	00	00.00	00	00.00	03	05.00

It is evident from the data that high majority of respondents considered the groundnut decorticator highly compatible in use (90.00 percent, highly efficient in quantity production (93.33 percent), highly efficient in quality production (95.00 percent). Little more than fifty percent (51.33 percent) respondents perceived the cost of groundnut decorticator as appropriate followed by little bit high cost(28.33 percent) and high cost(18.34 percent). High majority (85.00 percent) of respondents perceived low level of drudgery during use except few (8.33 and 6.67 percent) as moderate and high drudgery respectively. Similarly no chance of getting injured (96.70 percent) was perceived during use of groundnut decorticator. Only two (3.30 percent) respondents perceived somewhat chances of getting injured.

High majority of respondents considered the maize Sheller as highly compatible in use (83.33 percent), highly efficient in quantity production (76.67 percent), highly efficient in quality production (91.67 percent). Little more than fifty percent (51.67 percent) respondents perceived the cost of maize Sheller as appropriate followed by little bit high cost (23.33 percent) and high cost (25.00 percent). High majority (70.00 percent) of respondents perceived low level of drudgery during use of maize Sheller. Some (21.67 percent) of the respondents perceived maize Sheller as highly drudgery prone and few (8.33percen) as moderately drudgery prone . Similarly high majority (96.67 percent) perceived no chance of getting injured during use of maize Sheller. Only few (5.00 percent) respondents perceived somewhat chances of getting injured during the use of maize sheller.

Further, it is evident from the Table 2 that high majority of respondents considered the sickle as highly compatible in harvesting (80.00 percent), highly efficient in quantity harvesting (85.00 percent), highly efficient in smooth harvesting (80.00 percent) followed by moderately efficient (20.00 percent) in harvesting. Majority (63.33percent) of the respondents perceived the cost of sickle as appropriate followed by little bit high cost (31.67 percent) and only few perceived high cost (5.00 percent). Majority (65.00 percent) of respondents perceived low level of drudgery during use of sickle. Only sixteen to eighteen per cent of the respondents perceived sickle as moderately and highly drudgery prone tool respectively. Similarly high majority (91.67 percent) of respondents perceived no chance of getting injured during use of sickle. A few (3.33 and 5.00 percent) respondents stated about somewhat and high chances of getting injured during the use of sickle.

Table 3: Distribution of respondents according to overall acceptability of women friendly tools

Sr. No.	Level of acceptability	Ground nut decorticator		Maize Sheller		Sickle	
		f	%	f	%	f	%
1	Highly acceptable	55	91.67	51	85.00	52	86.67
2	Moderately acceptable	05	08.33	09	15.00	06	10.00
3	Not acceptable	00	00.00	00	00.00	02	03.33
	Total	60	100.00	60	100.00	60	100.00

The data given in Table 3 regarding overall acceptability of women friendly tools revealed that all three women friendly tools i.e groundnut decorticator, maize Sheller and sickle were perceived by high majority (91.67; 85.00 and 86.67 percent) of farm women as highly acceptable respectively. Only few (8.33; 15.00 and 10.00 percent) of respondents perceived these as moderately acceptable. Only two (3.33 percent) respondents perceived the sickle as not acceptable due to negative attitude towards accepting the new tools because they felt uncomfortable with new sickle. Kohli and Ruwali (2022) measured the extent of adoption of 10 drudgery reducing technologies introduced by the Department of Family Recourse Management, College of Home Science of G.B. Pant University of Agriculture and Technology. Among the various drudgery reducing technologies being promoted in the study area, adoption of improved sickle was found to be maximum, which was adopted by 192 (60.38%) respondents, followed by dung collector which was adopted by 92 (28.93%) farm women.

Table 4: Suggestions given by the respondents for modification and increasing acceptability of women friendly tools

S. No	Name of Women friendly tools	f	%
A	**Groundnut decorticator**		
1	Base of groundnut decorticator should be little bit heavy to avoid the problem of lifting from front side	58	96.67
2	Cost should be reduced so that everyone can afford to purchase	25	41.67
B	**Maize Sheller**		
1	Cost should be reduced so that everyone can afford to purchase	29.00	48.33
2	Should be available in the local market so that they can purchase it easily.	60	100.00
C	**Sickle**		
1	High cost in comparison of traditional sickle	22	36.67
2	Handle must be somewhat more strong from front side to avoid breakage	20	33.33
3	Width and length of curve should be more for easy cutting of bajari and jawar and to avoid its bending.	20	33.33

It is evident from the data given in Table 4 that high majority of respondents suggested that base of the groundnut decorticator should be heavy to avoid the problem of its lifting from front side during its operation. About forty two and forty eight percent of respondents expressed that cost of decorticator and Maize Sheller should be less so that everybody can afford to purchase these. Similarly in case of sickle it was suggested by the thirty seven percent of respondents that its cost should be less. Thirty three percent of respondents stated that handle of sickle should be stronger and its width and length also should be increased for easy cutting of jawar and bajari and to avoid its bending during use.

Table 5: Correlation between socio-economic characteristics of farm women and acceptability of women friendly tools

n=60

Sr. No.	Independent Variable	Acceptability of Women Friendly Tools (Dependent Variable)		
		Groundnut decorticator	Maize Sheller	Sickle
		r value	r value	r value
1.	Age	0.113	0.155	0.058
2.	Marital status	0.005	0.185	0.055
3.	Family type	-0.08	-.231	0.040
4.	Family size	-0.34	-.189	0.195

5.	Annual income	0.187	0.013	0.183
6.	Level of education	0.032	0.064	0.150
7.	Occupation of family	0.167	0.275*	0.274*
8.	Ownership of fixed assets (land , house, livestock)	0.291*	0.040	0.072
9.	Possession of Farm assets	0.64	-.129	-.066
10.	Possession of Household assets	0.433**	0.022	-.085
11.	Media ownership	0.24	0.189	0.277*
12.	Source of information used	0.338**	0.011	0.294*

It is evident from the "r" values given in Table 5 that correlation of various variables showed positive but non-significant correlation with the acceptability of all three selected tools. Occupation of respondent's family showed positive and significant correlation with acceptability of Maize Sheller and sickle. Ownership of fixed assets showed positive and significant correlation with acceptability of decorticator but non-significant with Maize Sheller and sickle. Possession of household assets showed positive and highly significant correlation with acceptability of decorticator. Media ownership showed positive correlation with acceptability of decorticator and maize Sheller but significant correlation with acceptability of sickle only. Sources of information used showed positive and highly significant and significant correlation with acceptability of decorticator and sickle respectively but non-significant with Maize Sheller.

Family type and family size showed negative and non significant correlation with acceptability of groundnut decorticator and Maize Sheller. Possession of farm assets showed negative and non-significant correlation with acceptability of maize sheller and sickle but positive with decorticator.

Conclusion

It can be concluded that there is a need to design drudgery reducing women friendly tools and equipment for farm women especially who belong to middle and low socio economic status and perform most of the agricultural activities manually. Farm women have different physiological characteristics than men. Their strength parameters and anthropometric measurements are different from men. Hence, the same tools and equipment for men and women may not be suitable. Awareness, acceptability and adoption of drudgery reducing tools is also essential. All women friendly tools were found highly acceptable on most of the parameters of acceptability. Only few suggestions have been given by the respondents for making modifications for easy acceptability of women friendly tools.

References

Grandjean E., 1988. Fitting the task to the man. 4th edition. London: Taylor & Francis.

Kohli P. and Ruwali P. N., 2022. A Sociological Study on Adoption of Drudgery Reducing Technologies by Farm Women in Kumaun Region of Uttarakhand, India. International Journal of Social Sciences Arts & Humanities. Vol. 9. No. 4. 2022, 91-97.

Mishra A., Singh S.R.K., Singh A., Borker J., Gour S. (2016). Inventory on Women Friendly Tools. ICAR-ATARI, Jabalpur. Pp 40

Singh A. Gautam U.S., Singh R. and Paliwal D. (2014) African Journal of Agricultural Research, 9(18), pp. 1386-1390.

Singh S. P., Singh M. K., Singh M. K. and Ekka U., 2019. Ergonomics for Gender Friendly Farm Equipment to Enhance Better Human-machine Interaction. RASSA Journal of Science for Society 1(1&2): 54-59.

LP 6.1

Fostering agripreneurship through Human Resource Development: A path to agricultural transformation

M. R. Bhatt[1] and R. S. Ghasura[2]

[1]Associate Professor, College of Agriculture, NAU, Bharuch

[2]Assistant Professor, College of Veterinary Science and Animal Husbandry, KU Navsari

Email: rghasura21@kamdhenuuni.edu.in; mrbhatt39@gmail.com

Introduction

Agriculture, historically the cornerstone of economies worldwide, stands at a crossroads today. While it continues to provide sustenance, livelihoods, and indispensable resources, it grapples with an array of pressing challenges. The confluence of rapid population growth, intensifying climate change, and the imperative for sustainable practices has brought agriculture to a pivotal juncture. In response, a dynamic solution has taken root: agripreneurship, an innovative approach that melds age-old agricultural practices with the spirit of entrepreneurship. Agriculture accounts for 20.2% of the total Gross Domestic Product (GDP), provides jobs for about 65% workforce and contributes to 14.1% of total exports in the year 2020-21.About 70% of the Indian population resides in rural areas and depends on agriculture directly or indirectly (Surya Rathore *et al.,*2022) Agripreneurship represents a paradigm shift that extends beyond mere cultivation. It embodies a transformation, where farmers transcend their traditional roles and embrace multifaceted roles as entrepreneurs. This entails amalgamating time-tested agricultural wisdom with contemporary business acumen and innovative thinking. The synergy between agricultural proficiency and entrepreneurial skills has the potential to usher in an era of agricultural resurgence, meeting modern challenges with innovative solutions. In the pursuit of nurturing successful agripreneurship, one facet stands out as pivotal: effective human resource development (HRD). This encompasses a gamut of activities geared towards enhancing the skills, knowledge, and mindset of individuals engaged in agriculture. Vijayakumar (2017) reported the status of the admission and placement scenario of agriculture stream graduates of over 22 Agricultural Universities in India. It is also stated that the All India placement status of agriculture graduates during 2011 to 2015 varied between 19.3 to 24.0 % (Agricultural Education Division, ICAR, 2020). HRD equips agripreneurs with the tools necessary to navigate the complexities of modern agriculture successfully. The implications of robust HRD within agripreneurship are far-reaching. Firstly, skill enhancement lies at its core. Training programs, workshops, and educational initiatives empower agripreneurs with technical expertise, enabling them to implement cutting-edge practices. Moreover, HRD fosters an entrepreneurial mindset, encouraging agripreneurs to think creatively, identify opportunities, and proactively address challenges. Additionally, HRD instills a profound understanding of market dynamics. Agripreneurs are equipped with insights into consumer preferences and emerging trends, thereby enabling them to align their produce with market demands effectively. By nurturing such knowledge, HRD opens doors to expanded market shares and the development of unique agricultural products. Furthermore, the adoption of sustainable practices constitutes a central tenet of agripreneurship facilitated by HRD. Agripreneurs gain insights into eco-friendly methodologies, resource optimization, and organic farming techniques. This not only bolsters ecological resilience but also capitalizes on the burgeoning demand for sustainable agricultural products. In conclusion, as agriculture stands on the precipice of transformative change, agripreneurship emerges as a beacon of hope. At the heart of this evolution lies the vital role of human resource development. By empowering agripreneurs with skills, insights, and entrepreneurial acumen, HRD fosters a resilient agricultural landscape capable of surmounting challenges and propelling sustainable growth. The concerted efforts of governments, institutions, and stakeholders to implement robust HRD initiatives will undoubtedly pave the way for a prosperous and sustainable agricultural future.

Agripreneurial Shift

The Agripreneurial Shift signifies a fundamental change in the agricultural landscape. It encompasses the metamorphosis of conventional farmers into astute business practitioners, whose expertise extends

beyond soil and seeds. The concept of entrepreneurial ecosystem in the past mainly emphasized personal and character traits, which significantly influenced one's success as an entrepreneur (Lewellyn and Wilson, 2003).Agripreneurship transcends the boundaries of traditional farming by harnessing contemporary methodologies, cutting-edge technologies, and a keen understanding of market trends. This shift marks a departure from subsistence-oriented agriculture to a realm of value-added enterprises, enriching both local economies and the global market sphere. Central to this transformative journey is the imperative for a proficient and adept workforce, meticulously trained to navigate the intricate nexus of agriculture and entrepreneurship. Thus, there are obvious evidences on the low placement of agricultural graduates after completion of their education. Many unemployed young graduates cannot help build India's five trillion Economy (Marwaha, 2021).

Key role of Human Resource Development

1. Skill enhancement

Skill enhancement through human resource development is a cornerstone of agripreneurial success. By imparting a comprehensive array of skills, both technical and managerial, HRD empowers agripreneurs to adeptly navigate the intricate tapestry of modern agriculture. Training programs assume a pivotal role in this endeavor, serving as knowledge incubators that nurture proficiency across multifarious domains. Technical skills are honed through modules on precision farming, ushering agripreneurs into the era of data-driven cultivation. Mastery over organic practices cultivates eco-friendly farming methods, fostering sustainable growth while catering to conscientious consumer preferences. Post-harvest management modules delve into the intricacies of preservation and quality maintenance, ensuring the longevity and value of agricultural produce. In tandem with technical prowess, managerial skills are cultivated. Financial literacy courses equip agripreneurs with fiscal dexterity, enabling them to make judicious investment decisions and navigate the financial intricacies of agribusiness. Moreover, adept management of resources, workforce, and supply chains is nurtured, enhancing overall operational efficiency. In essence, HRD acts as a transformative catalyst, nurturing agripreneurs into well-rounded professionals capable of harmonizing cutting-edge techniques with astute management. The government of India, with its programmes like Agri-Clinic – Agri-Business Centres (ACABC) scheme (April 9, 2002), Agri Udaan (2015), MUDRA (April 8, 2015), Skill India (July 15, 2015), Startup India (January 16, 2016) and Stand Up India (April 5, 2016), are additionally supporting budding entrepreneurs to commence and scale new ventures. This skill-centric approach lays the foundation for a thriving agripreneurial ecosystem, poised to embrace the challenges and opportunities of modern agriculture while contributing robustly to food security and economic growth. Cohen (2006) reported the entrepreneurial ecosystem will be more conducive if the role of each component is explored through formal and informal networks and physical and cultural infrastructure.

2. Innovation and technology adoption

Innovation and technology adoption form the bedrock of agripreneurial prowess. Human resource development (HRD) serves as the conduit through which farmers embrace a spectrum of cutting-edge technologies, spanning IoT devices, data analytics, and advanced irrigation systems. By harnessing HRD's transformative potential, agripreneurs remain attuned to dynamic technological trends. This knowledge empowers them to make astute, data-driven choices, cultivating sustainable and efficient farming practices. Ultimately, the synergy between HRD and technology propels agripreneurship towards a future where innovation underpins agricultural prosperity. Guerrero *et al*. (2016) emphasised the contribution of universities in promoting innovation and entrepreneurial activities.

3. Market understanding

Market understanding is a linchpin of agripreneurial triumph, and human resource development (HRD) serves as a gateway to this pivotal realm. HRD equips agripreneurs with the tools to unravel the intricacies of market dynamics and consumer predilections, enabling them to sculpt their products with precision. HRD imbues agripreneurs with the art of effective market research, providing them with the acumen to decode trends, anticipate demand, and discern competitive landscapes. By fostering a profound comprehension of supply chain management, HRD ensures seamless product flow from farm to market, enhancing reliability and minimizing wastage.

4. Risk management

Moreover, HRD's purview extends to value addition – a cornerstone of agripreneurial success. Through specialized training, agripreneurs can embellish their offerings, creating distinctive agricultural products that resonate with consumers' preferences and aspirations. This ability not only engenders customer loyalty but also positions agripreneurs favorably in an increasingly discerning marketplace. Armed with insights from HRD, agripreneurs can strategize effectively, capture larger market shares, and forge a unique identity. As agripreneurs transform from mere producers to savvy market players, the symbiotic relationship between HRD and market understanding becomes a catalyst for their ascendancy in the agripreneurial realm. Navigating the intricate landscape of agriculture demands adept risk management, an imperative fortified by human resource development (HRD). Agriculture's inherent susceptibility to climatic shifts and market volatility underscores the significance of equipping agripreneurs with comprehensive risk mitigation strategies. Mack and Mayer (2016) emphasised that an entrepreneurial ecosystem conducive to new candidates for entrepreneurship is needed. The entrepreneurial ecosystem in agricultural universities will play a key role in identifying, mentoring, and nurturing the innovative instincts and entrepreneurial potential of students, faculty members and staff and transforming them into startup entrepreneurs.HRD programs serve as custodians of risk management education, imbuing agripreneurs with the prowess to combat uncertainties effectively. Diversification of crops emerges as a formidable tool against environmental fluctuations, mitigating losses and ensuring consistent yield despite adverse conditions. Efficient resource management, another facet of HRD's impact, optimizes resource allocation and consumption. Agripreneurs, armed with the knowledge imparted through HRD, adeptly steer their operations towards resilience against resource scarcity and market fluctuations. Furthermore, HRD underscores the importance of financial tools such as crop insurance, a shield against unforeseen adversities. Familiarity with these tools empowers agripreneurs to hedge their bets, cushioning the financial impact of crop failures or market downturns. In a world characterized by uncertainty, HRD emerges as a beacon, illuminating the path of risk management for agripreneurs. By assimilating these strategies, agripreneurs safeguard their livelihoods, bolster resilience, and contribute to the fortification of the agricultural sector against the capricious nature of external forces.

5. Entrepreneurial mindset

The transition to agripreneurship demands a paradigm shift – a shift in mindset from conventional farming to embracing entrepreneurial principles. Human resource development (HRD) emerges as a transformative catalyst in fostering this essential entrepreneurial spirit, vital for thriving in today's dynamic agricultural landscape. HRD serves as a crucible for cultivating creativity, a cornerstone of the agripreneurial mindset. It encourages farmers to think beyond traditional boundaries, envisioning novel solutions and innovative approaches to age-old challenges. This creative impulse fuels the generation of pioneering ideas that transcend the ordinary. Furthermore, HRD hones problem-solving acumen, equipping agripreneurs with the ability to dissect challenges and engineer effective solutions. The cultivation of this analytical mindset not only enhances operational efficiency but also nurtures resilience in the face of adversity. Adaptability, another hallmark of the agripreneurial mindset, is nurtured through HRD's interventions. In an ever-evolving agricultural ecosystem, agripreneurs adept at swiftly responding to changing conditions are primed for success. This adaptability empowers them to seize opportunities, navigate uncertainties, and remain agile in the pursuit of their agripreneurial endeavors. Ultimately, the entrepreneurial spirit instilled by HRD unleashes agripreneurs as drivers of agricultural innovation. By fostering creativity, problem-solving abilities, and adaptability, HRD propels farmers into a realm where they are not just producers, but visionaries capable of reshaping agriculture through their ingenuity and tenacity.

6. Sustainability Practices:

Sustainability lies at the heart of enduring agripreneurial success, and human resource development (HRD) emerges as a potent force in nurturing this ethos. HRD assumes the crucial role of inculcating eco-conscious practices, propagating a harmonious synergy between agricultural progress and environmental stewardship. HRD is a conduit for disseminating knowledge on a spectrum of sustainable practices. From the implementation of eco-friendly techniques that minimize resource consumption to soil conservation

strategies that preserve the land's vitality, agripreneurs are equipped to cultivate while safeguarding precious natural resources. Organic farming methods, emphasized by HRD, encapsulate this commitment to sustainability. The dissemination of organic practices eschews chemical-intensive methods, nurturing soil health and biodiversity while ensuring the production of wholesome, chemical-free produce. Importantly, the ripple effect of HRD's sustainability focus extends beyond ecological dividends. In an era marked by heightened awareness of environmental concerns, agripreneurs primed with sustainable practices align with the burgeoning demand for eco-conscious products. This alignment bolsters marketability, opens doors to conscious consumers, and fortifies the economic underpinning of agripreneurship.

As HRD nurtures the seeds of sustainability, agripreneurs emerge as torchbearers of a resilient and responsible agricultural landscape. The marriage of eco-friendly practices and market acumen, fostered by HRD, paves the way for a greener, more prosperous future for both agripreneurs and the planet.

7. Networking and Collaboration:

Human resource development (HRD) serves as a dynamic catalyst, not only for individual agripreneurial growth but also for nurturing a robust collaborative ecosystem. Through HRD initiatives, agripreneurs are afforded invaluable opportunities to network, collaborate, and forge meaningful connections with peers, experts, and mentors. These interactions transcend mere transactions, fostering a fertile ground for knowledge exchange. Agripreneurs converge to share insights, innovations, and best practices, catalyzing a collective reservoir of wisdom. This collaborative ethos propels the entire agripreneurial community forward, steering it away from silos towards a culture of shared learning and progress. Furthermore, HRD-facilitated networking can culminate in strategic partnerships. Agripreneurs, united by common goals and complementary strengths, can pool resources, expertise, and efforts to embark on ventures that are mutually beneficial. This synergy not only amplifies individual impact but also underpins the growth of the agripreneurial sector as a whole. Importantly, HRD's role in fostering connections extends to financial support. Engagements with potential investors, financial institutions, and grant providers are nurtured through these networks. This access to funding avenues can be instrumental in propelling agripreneurs' ideas from conception to realization, propelling innovation and expansion. In essence, HRD's emphasis on networking and collaboration transcends individual growth, embracing the collective upliftment of the agripreneurial ecosystem. By sowing the seeds of camaraderie, knowledge exchange, and partnership, HRD cultivates a thriving environment where agripreneurs collectively sow the seeds of innovation, resilience, and progress.

Conclusion

In a world marked by evolving challenges and opportunities, the cultivation of agripreneurship through human resource development (HRD) emerges as a beacon of transformation for the agricultural landscape. This dynamic approach is a testament to the power of innovation, adaptability, and collaboration in shaping the future of food production and security. As we stand at the intersection of tradition and progress, agripreneurship encapsulates the fusion of time-honored agricultural practices with the vibrancy of entrepreneurial thinking. HRD's role in this journey is pivotal, nurturing a new generation of agripreneurs armed with a diverse toolkit of skills, knowledge, and a resolute entrepreneurial mindset. By imparting technical proficiencies, agripreneurs are poised to harness cutting-edge technologies, optimize resource allocation, and mitigate risks inherent in modern agriculture. HRD's emphasis on sustainable practices echoes nature's harmonious rhythms, paving the way for eco-friendly methods that simultaneously safeguard the environment and cater to the mounting demand for sustainable produce. Moreover, HRD kindles a spirit of innovation, turning challenges into opportunities and obstacles into stepping stones. Agripreneurs armed with problem-solving dexterity and the ability to adapt swiftly are equipped to seize the ever-shifting tides of agricultural progress. Yet, this transformative voyage necessitates a united front. Governments, institutions, and organizations must unite, collaboratively designing and implementing robust HRD programs that empower farmers across diverse landscapes to embrace agripreneurship. By fostering an ecosystem that nurtures the convergence of knowledge, resources, and expertise, we sow the seeds of a prosperous and sustainable agricultural future. In this culmination of tradition and innovation, agripreneurs emerge not only

as cultivators of crops but also as architects of change. The resonance of HRD's impact reverberates far beyond individual fields, weaving a tapestry of resilience, prosperity, and nourishment for generations to come. The cultivation of agripreneurship through HRD is more than a mere strategy – it is a promise, a commitment to ensure that agriculture evolves as a cornerstone of progress, embodying sustainability, resilience, and boundless possibilities.

References

Anonymous (2019). National Innovation and Startup policy 2019 for Students and Faculty. Retrieved on August 27 2023 from https://mic.gov.in/assets/ doc/startup_policy_2019.pdf.

Cohen, B. (2006). Sustainable valley entrepreneurial ecosystem. *Business Strategy and the Environment*, 15(1):1-14.

Guerrero, M., Urbano, D., Fayolle, A., Klofsten, M., & Mian, S. (2016). Entrepreneurial universities: Emerging models in the new social and economic landscape. *Small Business Economics*, 47(3): 551-563.

Mack, E. A., & Mayer, H. (2016). The evolutionary dynamics of entrepreneurial ecosystem. *Urban Studies*, 53(10): 2118-2133.

Marwaha, V. (2021). What Millennials Want: Decoding the Largest Generation in the World. Penguin Random House,India, 288p.

Lee, S. M., & Peterson, S. J. (2000). Culture, entrepreneurial orientation, and global competitiveness. *Journal of World Business*,35(4): 401–416.

Surya Rathore, Bharat S. Sontakki, G. Venkateshwarlu, Ch. Srinivasa Rao. (2022). Fostering Entrepreneurial Ecosystem in India: *The Agrivarsity Way*. ICAR-National Academy of Agricultural Research Management, Hyderabad, India. pp.23.

LP 6.2

Growing tomorrow's agripreneurs: A holistic approach to agriculture education

Hemlata Saini, J. B. Patel and Anusha Velamuri

Department of Agricultural Extension and Communication, Anand Agricultural University, Anand, Gujarat

Email: hlatahem@gmail.com

Introduction

Entrepreneurship is the dynamic process of creating, organizing, and managing a venture to exploit opportunities, innovate, and bring about change. It involves the identification of market needs, the mobilization of resources, and the assumption of risks to transform ideas into viable and sustainable businesses. According to a Global Entrepreneurship Monitor (GEM) report, the entrepreneurial activity rate, which includes nascent entrepreneurs and new business owners, provides a metric for understanding the prevalence of entrepreneurial endeavors globally. India witnessed an increase in Total Entrepreneurial Activity rate up to 14.4% in 2021, amidst COVID-19, while its precursor year was at 5.3%. In recent years, entrepreneurship has gained increasing importance as a catalyst for economic growth and job creation.

India, with its burgeoning population and diverse economic landscape, stands to benefit significantly from entrepreneurship. A study by the National Institution for Transforming India (NITI Aayog) reveals that fostering entrepreneurship can contribute to inclusive economic development by generating employment opportunities, promoting innovation, and addressing socio-economic challenges (Nirmala Mani, 2021). The Global Entrepreneurship Index (GEI) underscores the need for India to create a conducive ecosystem for entrepreneurs, emphasizing factors such as access to capital, infrastructure, and supportive government policies to enhance the country's entrepreneurial potential.

Agripreneurship and youth

Agripreneurship involves the application of entrepreneurial principles in the agricultural sector, aiming to create sustainable and profitable agribusinesses. With most of the Indian population relying on agriculture for their livelihood, agripreneurship holds immense potential to transform the sector. The Ministry of Agriculture and Farmers Welfare data indicates that agripreneurship can address key challenges such as low farm income, fragmented land holdings, and outdated farming practices. The scope of agripreneurship in India extends beyond traditional farming to include value addition, agro-processing, and technology-driven solutions, contributing to overall rural development (Sreelakshmi, 2021).

The youth playing a pivotal role in the future of India's agriculture is substantiated by demographic data revealing a significant youth bulge. Encouraging youth to embrace agripreneurship is crucial for the sector's modernization and sustainability. Reports from the National Sample Survey Office (NSSO) highlight the aging farmer population, underscoring the urgency for youth involvement. Youthful agripreneurs can leverage technology, implement innovative practices, and diversify agricultural activities. Additionally, fostering agripreneurship among the youth aligns with the government's initiatives like the "Start-up India" program, contributing to rural development and the country's overall economic growth.

Addressing the broader spectrum, the Government of India started the Attracting and Retaining Youth in Agriculture (ARYA) scheme to engage rural youth in agriculture-related activities. Through skill development and training programs, ARYA seeks to make agriculture a viable and attractive career option. The scheme addresses rural youth's challenges, providing them entrepreneurial skills, access to modern farming techniques, and exposure to agribusiness opportunities (Kavaskar, 2020). By enhancing rural youth's employability and income-generating potential, ARYA contributes to revitalizing the agricultural sector, promoting sustainable practices, and fostering economic growth in rural areas.

The Student Startup and Innovation Policy (SSIP) is a comprehensive initiative designed to nurture innovation and entrepreneurship among graduates from Gujarat. By fostering a culture of creativity and risk-taking, SSIP supports graduates in transforming their ideas into viable startups. The policy provides financial assistance, mentorship, and access to infrastructure to help graduates overcome the initial hurdles of starting a business. SSIP is instrumental in creating a conducive startup ecosystem, contributing to job creation and

economic development, and positioning graduates as key contributors to India's growing entrepreneurial landscape.

Parmar and Rathod (2020) found that perceived low margins in agriculture, government policies, self-efficacy and interest, and perceived risk were the key constraints mentioned by the agri-graduates. A policy drafted called the Agri-Clinics and Agri-Business Centers (ACABC) scheme is tailored to benefit agricultural graduates by encouraging them to become agripreneurs. Under this scheme, agricultural graduates receive training and financial support to set up Agri-Clinics and Agri-Business Centers, where they can provide extension services, consultancy, and value-added agribusiness activities. ACABC empowers agri graduates to apply their knowledge in a practical and entrepreneurial manner, fostering innovation in agriculture and addressing challenges in the sector. By supporting the establishment of these centers, the scheme contributes to the overall development of the agricultural value chain.

Student READY for entrepreneurship

The Student READY (Rural Entrepreneurship Awareness Development Yojana) program is an initiative focused on preparing agricultural graduates for entrepreneurship. It provides them with essential skills, knowledge, and exposure to various aspects of agribusiness. The program includes training modules on market dynamics, financial management, and agricultural technological interventions. By equipping agri graduates with the tools needed to navigate the complexities of entrepreneurship, the Student READY program enhances their employability and encourages them to establish their ventures.

Program Overview

As recommended by the 5th Deans' Committee (ICAR) for implementation by all state agricultural universities and agricultural institutes all over India with the objective of the programme will help in building confidence, skill and acquire Indigenous Technical Knowledge (ITK) of the locality and thereby, preparing the pass-out for self-employment. It also aims to provide opportunities to gain hands-on experience and entrepreneurial skills. The course curricula have been restructured to develop much-needed skills and entrepreneurial mindset among the graduates. To take up self-employment, contribute to enhanced rural livelihood, food security, the sustainability of agriculture and to be a propeller for agricultural transformation. High-quality professional competence, practical work experience in real life situations to graduates, production-oriented learning, production to consumption project working, facilitates producing job providers rather than job seekers and orientation under experiential learning is a major step. In-plant training is a short period of industry exposure to work culture (Saxena et al., 2023). The following components are proposed for carrying out one-year Student READY programme:

Components	Name	Credits	Duration
I	Rural Agricultural Work Experience (RAWE)	16 (0+16)	16 weeks
II	Agro-Industrial Attachment (AIA)	04 (0+04)	4 weeks
III	Experiential Learning (EL) / Hands-on Training (HOT)	20 (0+20)	20 weeks
		Total	**40 weeks**

The key objectives of Students READY programme

1. **Understand the rural setting:** Foster an understanding of the socioeconomic situation of farmers relevant to real field situations, ongoing extension & rural development programs, and develop competence to address issues like soil conservation, water management, and integrated pest management.
2. **Industry Exposure:** Facilitate industry visits, internships, and interactions with professionals in the agricultural sector and create opportunities for networking and collaboration with agricultural businesses, research institutions, and government agencies.

3. **Research Projects and Innovation:** Encourage students to engage in research projects related to agriculture and provide a platform for showcasing innovative agricultural ideas and solutions through student-led projects and competitions.
4. **Soft Skills and Leadership:** Develop soft skills such as communication, teamwork, and problem-solving. Cultivate leadership qualities and a sense of responsibility towards sustainable and ethical agricultural practices.
5. **Skill Development:** Equip students with hands-on skills in crop production, animal husbandry, agribusiness, and agricultural technologies.
6. **Entrepreneurship and Agribusiness:** Introduce students to the principles of agribusiness and entrepreneurship. Provide practical experience in farm management, budgeting, and marketing strategies for agricultural products.

Program Components

1. Classroom Instruction: Theoretical classes covering agronomy, animal science, agribusiness, and agricultural economics.
2. Practical Training: Hands-on training in laboratories and on-campus farms to apply theoretical knowledge.
3. Internships and Industry Attachments: Mandatory internships with agricultural businesses or research institutions.
4. Workshops and Seminars: Regular workshops on emerging trends, technologies, and issues in agriculture.
5. Research Projects: Encourage students to undertake research projects under the guidance of faculty.
6. Capstone Projects: Culminating projects that showcase students' comprehensive understanding and application of agricultural concepts.
7. Career Counselling: Guidance and counselling services to help students identify career paths and opportunities in agriculture.

Students may be assessed through examinations, practical assessments, project evaluations, and presentations. Successful program completion could lead to a certification or degree in agriculture, depending on the structure and duration of the program.

The Student READY Program in Agriculture aims to produce skilled and forward-thinking professionals ready to address the challenges and opportunities in the dynamic field of agriculture. The program prepares students to contribute meaningfully to the agricultural sector and adapt to its evolving landscape by combining theoretical knowledge with practical skills, industry exposure, and a focus on sustainability.

Success stories of Anand Agricultural University from the Student READY Program

Satvik Honey Enterprise

Name of the student entrepreneur: Darshan Kumar Sureshbhai Patel, Jaykumar Ashokbhai Gadhiya and Pratikkumar Mukeshbhai Patel

After undergoing an Experiential learning program on "Commercial Beekeeping" as a part of the curriculum in the 8th semester under the Student READY Programme, their interest in beekeeping developed during the training. In on-campus training, they learn all the theories and practicals related to beekeeping, while in the 'experiential learning program,' they are motivated to start their own enterprise on beekeeping. So, they learn practical approaches to starting their own enterprise by taking advice from the Department of Entomology and beekeeping entrepreneurs. After that, they started our own enterprise, **"*Satvik honey*"** during our academic study. Initially, they started from the hostel room, and after completion of Graduation; they were running their enterprise from our respective native place.

They had not taken financial help from home or bank. They started their enterprise with the 'Internship money they got that year and personal savings.

They are selling raw filtered honey. They purchased four buckets, one tank for bottle filling, two tanks for honey storage, and ten honey bee hives (initially), but today they have 50 hives, Glass bottles. They are selling

honey of our own hives and purchasing good quality raw honey from trusted sources. They follow migratory beekeeping also. Their approximate annual turnover is 9,50,000/year.

Suggestions

- Nowadays, even though there are tremendous opportunities for employment, more and more agriculture graduates are attracted to white-collar jobs. Hence, students after earning scientific knowledge to handle farming and allied fields, should be motivated andattracted to the agriculture sector through certain systematic programmes.
- Policymakers should consider student-READY programs that can increase students' employability in the agriculture sector to attract and retain more youths in agriculture for sustainable development.

References

https://www.vigyanvarta.com/adminpanel/upload_doc/VV_1221_14.pdf

Kavaskar, M. (2020). Strategies for Agripreneurship and Employment Generation in Agriculture and Allied Sector. In N. R. Chavan (Ed.), *Latest Trends in Agriculture Sciences* (Vol. 21, p. 71). Integrated Publications.

Nirmala Mani, N. (2021). Role of entrepreneurship in economic development of India. *International Journal of Creative Research Thoughts*, *9*(6), 2320–2882. https://ijcrt.org/papers/IJCRT2106102.pdf

Parmar, G., & Rathod, R. M. (2020). An empirical study on agripreneurship intentions among agriculture students. *Management & Technology Review*, *7*(1), 110–117.

Saxena, A., Sinha, A., & Shrivastava, P. (2023). Entrepreneurship development through experiential learning in agriculture sector. *The Pharma Innovation Journal*, *12*(1), 2711–2715. https://www.thepharmajournal.com/archives/2023/vol12issue1/PartAE/12-1-402-517.pdf

Sreelakshmi, C. (2021). Agripreneurship in India: Challenges and Way Forward. *Vigyan Varta*, *2*(12), 56–61.

LP 6.3

Nurturing excellence: Unveiling the crucial role of training in HRD

K. V. Gardhariya, P. H. Vihariya, Y. H. Rathwa
Extension Education Institute, Anand

The HRD imperative: Setting the stage

In the ever-evolving landscape of modern government organizations within the Agricultural Sector, the quest for excellence and sustainability is an unceasing endeavor. Achieving and maintaining a competitive advantage in this crucial sector requires not only the deployment of cutting-edge technologies and innovations but also a deep commitment to nurturing and harnessing the most valuable asset: the human capital. This commitment finds its expression in the discipline of Human Resource Development (HRD), a multifaceted and dynamic approach to building and enhancing the capabilities of the workforce dedicated to agricultural initiatives.

At the heart of HRD within the Agricultural Sector lies an essential component: training. It plays the pivotal role in this specialized realm of HRD. Training programs has profound impact on the success of agricultural initiatives, the professional growth of government employees, and the cultivation of a thriving, adaptable workforce dedicated to bolstering agricultural sustainability. As we navigate through the intricate web of HRD within the Agricultural Sector, we shall witness how training has metamorphosed over time, from rudimentary classroom sessions to cutting-edge digital experiences, shaping the modern landscape of HRD tailored to the unique needs and challenges of those dedicated to the vital task of promoting agricultural excellence and sustainability within government organizations.

Training through the ages: A historical perspective

The evolution of training has been a dynamic process, adapting to societal, technological, and industrial changes. Over the ages, training methods have evolved significantly, shaped by factors like technological advancements, educational theories, and workplace demands. Here's an overview of key stages in training's evolution:

1. **Ancient Apprenticeships to Guilds** *(Ancient Times to Middle Ages):* In ancient civilizations, skills were passed down through informal apprenticeships. Guilds in medieval Europe standardized training for artisans, ensuring comprehensive education in their chosen trade.
2. **Industrial Revolution** *(Late 18th to 19th Century)*: As machinery emerged during the Industrial Revolution, a more systematic approach to training was required. Formal apprenticeships and vocational schools were established.
3. **Scientific Management and Taylorism** *(Late 19th to Early 20th Century)*: Frederick Taylor's scientific management principles optimized work processes. Training focused on breaking tasks into steps and efficient execution.
4. **World War II and Training Programs** *(Mid-20th Century)*: Large-scale training programs during WWII introduced instructional design innovations and multimedia elements.
5. **Computer-Based and E-Learning** *(Late 20th Century)*: Computers and the internet transformed training with computer-based and later e-learning, making learning flexible and accessible.
6. **Blended Learning and Personalization** *(21st Century)*: Training now combines in-person and online resources, with personalized learning experiences.
7. **VR and AR Training** *(21st Century)*: Virtual and augmented reality technologies are used for realistic simulations and immersive training.
8. **Data-Driven Learning and AI** *(21st Century)*: Data analytics and AI personalize training, enhancing its effectiveness.
9. **Remote and Hybrid Work Training** (Post-2020): The pandemic accelerated remote work and virtual training, emphasizing digital collaboration tools and asynchronous learning.

Training continues to evolve to meet changing needs and emerging technologies, ensuring individuals and organizations acquire essential skills for success in a dynamic world.

Benefits of training in HRD

The strategic value of training in HRD extends far beyond the acquisition of new skills. Training programs are instrumental in driving organizational growth and competitiveness. Let's delve into the multifaceted benefits that effective training brings to the table.

- First and foremost, training enhances the capabilities of the workforce, aligning their skills with the organization's strategic objectives. Employees equipped with the latest knowledge and competencies are better positioned to contribute to innovation, process improvement, and overall organizational success.
- It can develop self-awareness, inter-personal skills, achievement motivation and such other behavioral attributes
- Another critical advantage of training is its impact on employee motivation and job satisfaction. This, in turn, results in higher productivity and a positive workplace culture.
- It can help in creating professionalism and learning culture in organization
- HRD can include ethics training to ensure that employees understand and adhere to ethical standards and values in their work.
- It can update people with current change in technologies

From classroom to cyberspace: Modern training modalities

In the contemporary business environment, the methods and technologies used for training have diversified and advanced exponentially. Traditional classroom training, while still valuable, has been complemented and, in some cases, supplanted by innovative approaches.

1. **Lecture:** It is a method of verbal presentation on a topic by speaker to a group of audience. It should be well organized and well prepared. Visual aids may be used during the talk to sustain the interest.
2. **Discussion:** The lecture method may be made more participative if at the end the audience is allowed to discuss the topic in presence of the speaker. The task of the discussion leader is to pose the questions, stimulate participation of the shy members, keep individual participants from monopolizing the time, keep them on subject and make final summary.
    a. Buzz Group: This technique involves dividing a large group into much smaller ones in which the topic is discussed with a limited period of time. The groups are expected to produce as many ideas, opinions or suggestions as possible within time limit. A member in each buzz group who has been selected by their group may report their ideas to the whole group. The purpose of this technique is to involve each and every participant.
    b. Panel Discussion: A panel is a small group discussing a topic in a large group situation. In this, there may be three or four experts who discuss an issue or a problem. the mutual interaction among panelists themselves and with the audience can lead to an effective understanding the topic.
    c. Colloquium: This is a modified version of panel discussion in which three or four resource persons discuss a specific topic. In colloquium, there is more of audience participation.
3. **Demonstration:** A method demonstration is given before a group of people to show them how to carry out a new practice or an old practice in a better way.
4. **Case Study:** In this method a written case or a problem situation is presented to the participants for careful study and examination from all facets so as to enable them to exercise their analytical, synthetical and decision-making powers.
5. **Brainstorming:** Here a group is given a problem and asked to produce as many solutions as possible within a stipulated time period. Spontaneity and creativity are important parts of the process. Ideas are presented or recorded so that everyone can see them. Then the group is asked to reflect on these ideas/ suggestions and evaluate their merits and demerits. A reasonably small number of worthwhile final solutions may emerge from this evaluation.

6. **Role Play:** The participants can be made to act and relive a particular situation so that they get a real feel of the roles they are actually called upon to play. The purpose of this is to help participants experience what something "sounds" or "feels like".
7. **Sensitivity Training:** It is also known as laboratory Training or T group. It aims to enlighten participants about their own reactions and interpersonal relationships. Training is conducted with 8-10 trainees. Trainers help the group in analysis their behavior and experiences Each participant serves as object of study by himself. Use of exercises and instruments involve participants. Individuals become sensitive about their own perceptions and hidden feelings of others. This method is based on the premise of individual need to understand themselves before. Establishing satisfactory relationship with others by becoming sensitive to other people's hidden feelings.
8. **Training Camp:** Training may be organized in a camp like situation with a very busy schedule of working the elements of organizing community work may also be naturally conducted in field situation. They provide good setting for inculcating skills of teamwork and joint action.
9. **Field Trip:** Use of pre structured film. Trips may be very much helpful in providing direct experience of actual situation. Opportunities of meeting and talking with those already occupying and exercising leadership functions, visiting their projects and observing their methods of organization may help in visualizing their roles.
10. **Project Work:** Involvement of trains in some ongoing projects through working is quite helpful in acquiring practical skills.
11. **e-training:** E-training, also known as online training, leverages technology to provide flexible and accessible learning experiences. It transcends geographical barriers, allowing individuals worldwide to access a variety of content formats, including interactive videos and gamified elements. In the professional realm, e-training enhances employee development by offering tailored programs that align with job roles and industry requirements, fostering continuous learning and adaptability.
12. **Virtual reality (VR) and Augmented reality (AR):** Virtual Reality (VR) and Augmented Reality (AR) are revolutionizing training and education by creating immersive and interactive learning experiences.

VR allows trainees to be fully immersed in a virtual environment, replicating real-world scenarios. This is particularly valuable in fields like medicine and aviation, where trainees can practice complex procedures and simulations in a safe, controlled setting. It also enhances soft skills training, such as communication and leadership, by creating realistic interpersonal scenarios.

AR, on the other hand, overlays digital information onto the real world, making it accessible through devices like smartphones or smart glasses. In training, AR can provide on-the-job guidance and enhance situational awareness. For example, technicians can use AR glasses to receive step-by-step instructions while performing complex repairs, reducing errors and downtime.

Both VR and AR offer the advantage of learning by doing, promoting active engagement and retention. They also cater to diverse learning styles and can be adapted for remote training, making them versatile tools in the modern training landscape.

Training Process Unveiled: Crafting Excellence

A. Pre- Training
   1. Training Need Assessment
   2. Designing of Training Programme

B. Training
   3. Implementation of Training Programme
   4. Monitoring
   C. Post- Training

5. Evaluation of Training Programme
6. Follow-up

1. Training Need Assessment

A training need is a gap which exists between the job requirement and actual job performance of employee or personnel. Training Need Assessment is a means to find out who, if anyone, needs training and what kind of training they need. Training Needs Assessment (TNA) is a crucial step in the development of effective training programs. It serves as the foundation for identifying the specific knowledge and skills that individuals or a workforce need to acquire. By conducting a TNA, organizations can establish clear training objectives, ensuring that the training addresses the identified gaps. This process also guides the creation of appropriate training materials and the selection of the most suitable training strategies. Additionally, a TNA aids in the development of evaluation instruments, enabling organizations to measure the effectiveness of their training initiatives and make necessary improvements for ongoing learning and development. In summary, a TNA is essential for tailoring training efforts to meet specific needs and achieve desired outcomes.

2. Designing Training Programme

The design of a training program constitutes a critical phase in the overall training process, encompassing distinct components such as Training Objectives, Training Contents, Selection of Training Methods and Aids, Time Estimates, Resource Allocation, Participants' Assignments, and Evaluation Methods. The meticulous consideration and integration of these elements collectively determine the efficacy and precision with which the training initiative is executed and orchestrated. These tasks collectively contribute to the strategic planning and successful implementation of the training program.

3. Implementation

The effective implementation of a planned training program is paramount, as meticulous planning alone does not guarantee utility unless executed with precision. The implementation phase places heightened emphasis on the inherent qualities of the training and the efficacy of the trainer. A trainer possessing technical acumen, substantial experiential background, adept skills, receptivity to novel concepts, keen observational abilities, and an inquisitive mindset is consistently well-received by participants. This stage is dedicated to the faithful execution of the established plan, aligning with the preconceived strategies for the successful realization of the training program.

4. Monitoring

Monitoring is essential to making the training meaningful and keeping it on track. The continuous monitoring of training activities serves as a crucial mechanism for sustaining command over the procedural dynamics and facilitating a proactive, adaptive response.

5. Evaluation

Evaluation is the assessment of the degree to which desired objectives have been achieved or progress has been made in the intended direction. It involves determining the success or value of a program in relation to pre-established goals, essentially measuring the program's performance against predetermined objectives.

6. Follow-up

The implementation of a follow-up evaluation in the training process serves as an optimal method for gauging learning transfer. This approach facilitates a comprehensive assessment of the extent to which participants have assimilated and applied acquired knowledge within their professional contexts. Subsequent to the training intervention, engaging in post-training evaluations enables training developers to ascertain the degree of information retention among learners and evaluate the practical application of acquired skills in their respective occupational settings. By conducting follow-up assessments after learners have had the opportunity to integrate learned concepts into their work environments, a more nuanced understanding of the efficacy and real-world impact of the training program can be obtained.

Challenges and solutions

While training offers numerous benefits, it is not without its challenges.

- One challenge is the resistance to change. Employees may resist training initiatives if they perceive them as disruptive or if they are not convinced of the benefits. Effective communication, clear objectives, and a transparent rationale for training can help address this resistance.

- Another challenge is aligning training with organizational goals. Training programs that are not closely aligned with an organization's strategic objectives may fail to produce meaningful results.
- Resource constraints, including budget limitations and time constraints, can also pose challenges.
- Moreover, we will address the challenge of maintaining momentum and enthusiasm for training programs over time. The initial excitement surrounding a new training initiative can wane if not sustained. Strategies for sustaining engagement and ensuring continuous learning will be discussed.
- Training is not one-shot affair. A person requires many exposures and at different stage in the career to become competent.
- Training is not solution to problems other than lack of competencies.

To address the challenges mentioned in training, you can implement various technical and scientific solutions. Here are some strategies for each challenge:

- Motivation for training: Training in vacuum will not produce change. People do not necessarily learn better by attending top-notch training programmes. Motivation is important pre-condition for training. Utilize machine learning algorithms to tailor training content to individual employees' needs and preferences. This approach makes training more engaging and relevant to each learner.
- Commitment at the top: Do the top bosses take training seriously. Commitment, Presence and expectations of top officials send positive signal down the ladder and enhance participation.
- Incorporate game elements, such as badges, leaderboards, and rewards, into the training process to make it more enjoyable and motivate participation.
- Break down training content into small, digestible modules that employees can access when they have limited time. Microlearning can be more cost-effective and time-efficient.
- Utilize cloud-based platforms that offer scalable training solutions, reducing the need for expensive on-premises infrastructure.
- Create online communities or forums where employees can share their experiences, questions, and successes related to training. Encourage peer support and knowledge sharing.
- Develop clear career development pathways that include ongoing training, mentorship, and skills assessments, emphasizing that training is a lifelong journey.
- Use data analytics to identify the root causes of workplace issues. Training should be part of a broader solution that addresses underlying organizational challenges.
- Co-operation between work organization and training institution: training alone cannot hep bring change. Equally important is the help and support of work organization for creative suitable environment and facilities to apply new learning.

Tomorrow's training: Preparing for the future

The world of work is undergoing rapid transformation, driven by technological advancements, demographic shifts, and changing workforce expectations. In this section, we will explore emerging trends in HRD training and how organizations can prepare for the future.

One notable trend is the integration of artificial intelligence (AI) and machine learning into training programs. AI-powered personalized learning platforms can adapt training content to individual learners' needs and preferences, making training more efficient and effective.

Virtual reality (VR) and augmented reality (AR) will continue to play a significant role in training, particularly in industries that require hands-on experience. We will explore how these technologies are reshaping training experiences.

Furthermore, the concept of lifelong learning is gaining prominence. Employees are no longer looking at training as a one-time event but as an ongoing process throughout their careers. Organizations that embrace a culture of continuous learning are better positioned to attract and retain top talent.

The future of training is also marked by increased emphasis on soft skills such as emotional intelligence, creativity, and adaptability. These skills are becoming increasingly valuable in a rapidly changing world.

Conclusion

The pursuit of excellence in the Agricultural Sector hinges on robust Human Resource Development (HRD), with training as its linchpin. The historical trajectory from ancient apprenticeships to contemporary AI-driven platforms signifies the adaptive nature of training methods to societal and technological shifts. Beyond skill acquisition, effective training is pivotal in fostering organizational growth and cultivating a positive workplace culture. Challenges such as resistance to change demand innovative solutions like personalized content delivery through machine learning algorithms. Looking forward, emerging trends such as AI integration, virtual reality, and the emphasis on lifelong learning are poised to redefine HRD. This future underscore the importance of continuous adaptation and places heightened significance on developing soft skills, steering organizations toward sustainable success in the dynamic landscape of the agricultural sector. The synergy of technological advancements and strategic training initiatives will be instrumental in navigating the sector's complexities and ensuring enduring excellence.

References

A. C. Boud, D. J. Haniff, C. Baber and S. J. Steiner (1999). "Virtual reality and augmented reality as a training tool for assembly tasks," *IEEE International Conference on Information Visualization (Cat. No. PR00210), London, UK,* pp. 32-36, doi: 10.1109/IV.1999.781532.

Horton D. (2002). *Planning, Implementing, and Evaluating Capacity Development*. ISNAR Briefing Paper 50.

ICAR (2015). *Training Policy 2015, Indian Council of Agricultural Research*.

ICAR, (2020). *Handbook of Agricultural Extension*.

Kaplan, A. D., Cruit, J., Endsley, M., Beers, S. M., Sawyer, B. D., & Hancock, P. A. (2021). The effects of virtual reality, augmented reality, and mixed reality as training enhancement methods: A meta-analysis. *Human factors*, *63*(4), 706-726.

Lynton, R. P., & Pareek, U. (1990). *Training for development* (No. Ed. 2). Kumarian Press.

LP 6.4

Human resource and entrepreneurship development

Sarita Sanwal[1], Serene Shekhar[2] and D. B. Patel[3]
Assistant Professors
[1&2]ASPEE College of Nutrition and Community Science
Sardarkrushinagar Dantiwada Agricultural University; Gujarat
[3]Associate Director of Extension, S. D. Agricultural University, Sardarkrushinagar-385506
Email: sksanwal@sdau.edu.in

Human Resource Development is the framework for helping employees develops their skills, knowledge, and abilities, which in turn improves an organization's effectiveness. Human Resource Development (HRD) is that part of Human Resource Management which specifically deals with the training and development of employees. It helps the employees in developing their knowledge, skills and abilities to achieve self-fulfilment and support in the accomplishment of organizational goals. It is a process of enhancing the skills, knowledge, and competencies of the workforce to achieve organizational goals.

Human Resource Development

Human resource development helps organizations develop their workforce through employee training and career development which improves organizational effectiveness and performance. Human resource development may include many different opportunities, activities, and employee benefits, such as:

- Performance management and development
- Employee coaching
- Mentoring
- Succession planning
- Tuition assistance
- Organizational development

How does human resource development work?

Organizations have many opportunities for human resource development, both within and outside of the workplace. Human resource development can be formal or informal.

Informal development includes:

- Coaching by managers
- Mentoring by more experienced employees
- Collaborating with highly trained colleagues

Formal development includes:

- In-classroom training
- College courses
- Planned organizational change
- Internal training provided by staff or a paid consultant or facilitator

Employee gains more experience, knowledge, and training, they may be tapped for a leadership role, which could then involve more specialized management training. During this time, the employee, with help from the organization's focus on human resource development, has improved their effectiveness and productivity, boosting your company's bottom line and overall success.

Tips for Internal Training

By providing internal management training, you help develop your employees' strengths as well as their ability to contribute to your organization.

Human Resource Development (HRD) is a continuous process that aims to improve the skills, knowledge, and abilities of employees in an organization . The need for HRD arises due to several reasons, including:

1. To create a climate free from monotony and to improve the working life.
2. To facilitate effective communication to surface creative ability of employees in full swing.
3. To enable the members to attain self-actualization through systematically developing their potentials.
4. Tapping the present and future creative abilities of the people to utilize for organizational development.
5. Facilitating growth of employees and making them aware of their strengths and weaknesses

People need competencies (knowledge, attitudes, values and skills) to perform tasks. Higher degree and quality of performance of tasks requires higher level of degree of skills. Without continuous development of competencies in people, an organisation is not likely to achieve its goals. Any organisation that is interested in improving its services and its effectiveness needs to develop its employee competencies to perform the tasks required to bring about such improvements

The HRD is required for:

- Growth of organisation.
- Diversification in an organisation
- Renewing itself to become more effective
- Improving the systems and services of an organisation
- Change and becoming more dynamic
- Playing leadership roles

HR responsibilities: HR's primary activities include recruitment, administration, compensation and benefits, training and development, and employee relations and performance management.

Entrepreneurship

An *entrepreneur* is a person who undertakes a venture with some profit potential and involving a considerable amount of risk and therefore, entrepreneurship is the venture undertaken by the entrepreneur. The most obvious example of entrepreneurship is the starting of a new business. Entrepreneurship development is basically the process of improving the skill set as well as the knowledge of the entrepreneurs. This can be done through various methods such as classroom sessions or training programmes specially designed to increase the entrepreneurial judgement.

Entrepreneurship can be of varying degrees and is not necessarily alike. It can be categorized into various subcategories, starting with small and home businesses to multidimensional industries that were started from the ground level. Anyone who has the capacity to start a venture and undertake risks can become an entrepreneur. But not all entrepreneurs are successful. There are certain characteristics of entrepreneurship that make for a successful venture. So let us talk a little about these traits that an entrepreneur must possess in order to be successful.

A person, who organizes, operates and assumes the risk in business venture. Entrepreneurship is the ability and readiness to develop, organize and run a business enterprise, along with any of its uncertainties in order to make a profit. The most prominent example of entrepreneurship is the starting of new businesses. Entrepreneurship is the process of creating something new of value by devoting (giving) the necessary time and effort by accepting and acknowledging the necessary financial, psychological and social risks and receiving the resulting rewards be it monetary and personal satisfaction and freedom to do what you want.

Role of entrepreneur

1. Entrepreneur is an organizer 2. Entrepreneur as a risk bearer 3. Entrepreneur as coordinator and supervisor 4. Entrepreneur as a leader 5. Entrepreneur as opportunist

Entrepreneurial skills

1. Creative problem-solving 2. Persuading 3. Negotiating 4. Selling 5. Proposing 6. Holistically managing business/projects/situations 7. Strategic thinking 8. Initiative decision-making under certainty 9. Networking

Importance of entrepreneurship

1. Creation of Employment 2. Innovation 3. Impact on Society and Community Development 4. Increase Standard of Living 5. Supports research and development

Why most entrepreneurs fail?

1. Not having enough money 2. Not knowing your market 3. Lack of vision 4. Biting off more than you can chew 5. Trying to be everything to everyday 6. Not enough marketing 7. Poor planning 8. Not accepting constructive criticism 9. Not delegating 10. Lack of soft skills Characteristics of entrepreneurship

While there can be as many characteristics of entrepreneurship as there are people in this world with opinions, there are some characteristics that are considered indispensable or necessary in an entrepreneur. These are listed here as follows.

Ability to take risks

This is the first and foremost trait of entrepreneurship. Starting any business involves a considerable amount of risk of failure. Therefore, the courage and capacity to take the said risk are essential for an entrepreneur.

Innovation

In a world, where almost everything has been done, innovation is a priceless gift to have. Innovation basically means generating a new idea with which you can start a business and achieve a substantial amount of profits. Innovation can be in the form of a product, i.e., launching a product that no one is selling in the market. It can also be in the form of process, i.e., doing the same work in a more efficient and economical way.

Visionary

Every entrepreneur needs to be a visionary. Without a vision for the future of his venture, he or she would just be working aimlessly without reaching any point of success.

Leadership

An entrepreneur has a vision. However, it takes a lot of resources to turn that vision into reality. One of these resources is the people that the entrepreneur hires to perform various functions like production, supplying, accounting, etc. A single person cannot perform all the tasks and therefore it is important to bring some more people to do it. This also makes leadership very important as a leader provides the required direction to the efforts of the employees. Without proper leadership, everyone would be working independently without achieving the desired results.

Open minded

A good entrepreneur realizes that every situation can be a business opportunity. Thus can be utilized for the benefit of the organization. For example, Paytm realized the significance of demonetization and recognized that the need for online transactions was more than ever during this time and so it utilized and grew massively during this period.

Confident and well informed

An entrepreneur needs to be confident about his ideas and skills. This confidence also inspires the confidence of the people working for him as well as the other stakeholders involved in his business. This confidence comes from being well informed about the industry and environment. Various legal and political policies enhance business and trade opportunities, while some hinder them. Having knowledge about these can really help an entrepreneur make the right decision at the right time.

Clear view of the objective of the program

Before you get into training the prospective entrepreneurs, it is very important to have a clear objective and plan in mind about what the program is going to encompass.

Without a proper plan and direction, the training would not yield the desired results. This would lead to a loss of time, money, effort and most of all, valuable potential.

Selecting the potential targets

It is important to select the potential targets who are willing to enhance their skills and who can be identified as the people who have some amount of business acumen. These can be further divided into two categories- the educated target audience and the uneducated target audience.

Educated audience refers to the target people who have a decent educational background and want to be entrepreneurs. These people have the motivation to put their education to use by starting a venture and working for themselves.

Uneducated audience refers to the people who are not as privileged as others in terms of education about the market and have the potential to become entrepreneurs. These people are constantly looking for alternative ways to earn money and support their families. Therefore they are highly motivated and, given the right training and direction, can prove to be exceptional entrepreneurs.

Identifying local talents and markets

The process of entrepreneurship development program can be seen as most effective and efficient when it is applied in the local markets and on the local entrepreneurs who know about it. These people understand and absorb the knowledge way more quickly and can apply it in the current scenario because of which the results of the program can be seen more quickly and effectively.

Choosing the right location

In India unfortunately, these programs can only be launched where support institutions and resources are available, but ideally, these programmes should be planned and launched in the areas where most people are interested and willing to take advantages of these programmes so that this opportunity can be used most effectively and there is no loss of resources.

Tying up with Institutions

A lot of times these programmes involve tying up with various institutions like universities, NGO and some private institutions. This is done to give a real-world experience to assist the program and give the people some idea of the situations in the real world.

Develop the Entrepreneurship Program as Needed

People and their skill sets are different and develop over time. Thus, it is very important to keep developing the programs to suit the needs of the people enrolled in it. Moreover, the focus must be on harnessing their strengths and working to minimize their weaknesses.

Analyze the Result for Future Development

This is a very important and final step in the process of entrepreneurship development. After the program has run its course, it is very important to analyze the effectiveness of the program. This is necessary to ensure that in future more effective programs can be developed. For this one has to minimize the shortcomings of the existing program.

Some important factors that influence entrepreneurship are :

1. Economic Environment
2. Social Environment
3. Psychological Factors
4. Political Factors
5. Competitive Factors
6. Geographical Factors
7. Socio- cultural Factors
8. Technological Advancement

An entrepreneur is someone with the desire and ability to create and successfully run a business. Some types of entrepreneurs include:

Inventors: These are entrepreneurs who come up with a new product or service and sell it.

Small business owners: These are entrepreneurs whose businesses have less than 500 employees.

Online business owners: These are entrepreneurs who perform most of their commercial activities online. Examples include e-commerce owners and bloggers.

Home-based entrepreneurs: These are entrepreneurs who manage the operations of their business from home.

Indian Entrepreneurship Development Challenges

- **Capital:** India has a very low per capita income compared to other countries. The allocation of resources to futile endeavours is the primary cause of this. Youth have limited access to technical and vocational education institutions. Students' broad education in school is insufficient to support entrepreneurs.
- **Motivation Centres:** There aren't many training facilities, and the ones that exist are mostly in cities.
- **Low Mood:** Typically, children are advised to pursue lucrative careers to secure their futures. As a result, there is little desire to start a business.
- **Competition:** Major corporations dominate both domestic and international markets. This presents a significant challenge for business owners. The government incentivises public firms to operate in the public sector.
- **Corruption:** Bureaucracy, delays, and incompetent government agencies stifle the nation's entrepreneurship.
- **Backward Thinking:** Uncertainty about innovative ideas has led to hesitancy and the rise of anti-progressive thinking.

Prospects of Entrepreneurship Development in India

- India offers incredible potential for entrepreneurship development. As India's unemployment rate rises, so does youth dissatisfaction, leaving only entrepreneurship development as a viable option. The following are some excellent start-up prospects for an entrepreneur.
- **Tourism:** India's tourism industry is expanding. With the number of domestic and foreign tourists increasing year after year, this is a hot area that companies should pay attention to. India has a lot to offer foreign tourists, with its diverse culture and rich legacy. India provides everything tourists are searching for: beaches, hill stations, heritage sites, wildlife, and rural life.
- **Autos and auto-components:** India has become a hotbed for automobiles and auto components. The automobile industry is a viable sector for entrepreneurs because it is a cost-effective hub for obtaining vehicle components for global automakers.
- **Textiles:** India is known for its high-quality textiles. In terms of clothing, each state has its style. Given the enormous need for clothing, India has the potential to become a favored destination for textile manufacturing.
- **Education :** Education and online tutorial services are in high demand. India can attract more international students if it provides adequate facilities at reasonable prices. To make the sector relevant and entertaining, unique teaching methods, educational portals, and technologies can be employed effectively.
- **Transportation:** India has wide opportunities in transportation because here lack of transport facilities. e.g. public transport, good transports, air transport etc. The entrepreneur can start transport service for public like online taxi service, travelling agency, goods transport service, air taxi, transport service for agricultures, special transport service like; medicines, livestock, fruits, chemicals, refrigerated vans or trucks, industrial large equipment transportation etc.
- **Food Products:** India is famous for their delicious foods. Also it is second largest food producer of the world. There are large possibilities of growth and expansion of in area like; producing, consuming, export, store, transport, packing, refrigeration, canning etc. The quality product demands and food service demands of consumers have opened up more opportunities in country as well as outside of country in food processing and equipment industry.

- **Online Work:** Government takes initiative to introduce India as a "Digital-India" and also introducing several schemes to motivate public for doing online transactions. This saves lot of time and money. People can easily do anything on one click of their phone. The entrepreneurs can work in this area.

Nature of Entrepreneurial Behaviour

Entrepreneurial behavior includes innovations, creativity, creative organization, values, qualities of a successful entrepreneur, and the social responsibilities to be assumed by him.

Successful entrepreneurs plan their day in advance, get proper nutrition and exercise, position themselves to serve, and set clear goals. Entrepreneurial performance is determined by the environment and the individual capacity and will (i.e., ability and motivation) to deal with the environment (organizational design and context).

Entrepreneurial behavior is the actions taken by an entrepreneur to reach desired goals. It is restricted to tasks that are or can be under the control of the entrepreneur, such as the role of the board, organization, decision making, and goals and strategies . The basic argument is that an understanding of entrepreneurial behavior is better understood by examination of behaviors that are under the control of the entrepreneur. Only when we understand the determinants of entrepreneurial performance can we link entrepreneurial behavior to business performance.

Entrepreneurial behavior is characterized by the following qualities :

1. Unafraid of failure
2. Happy to work hard
3. Brave
4. Lifelong learner
5. Innovations
6. Creativity
7. Creative organization
8. Values
9. Qualities of a successful entrepreneur
10. Social responsibilities to be assumed by the entrepreneur

Entrepreneurial qualities are essential for an entrepreneur to succeed in their business ventures. It is important to note that entrepreneurial behavior is not limited to these qualities and can vary depending on the individual and the business they are involved in.

Organisational behaviour involves two levels of analysis of behaviour:

1. Individual Behaviour:

Every individual is different from others. They are differing in physical characteristics, intelligence, aptitudes, attitudes, personality, and skills eta. All these skills help an individual to interact with other fellow members in an organisation. Various factors which influence the behaviour of individuals are ability, perception, motivation, organisational factors, socio-cultural factors etc.

2. Group Behaviour:

A group consists of two or more persons who interact with each other, consciously for the achievement of certain common objectives. Every job in the organisation is interdependent and every task requires the cooperation from all the members in order to excel in the organisation. Various factors which affect the group cohesiveness are nature, size, location, communication, status of the groups etc

Organizational development and management are important for the growth and success of an organization. Here are some key points:

1. **Organizational development** enhances the skills and abilities of leaders and managers, allowing them to provide better support to their teams, facilitate change, and make well-informed decisions.
2. **Management development** is the process by which managers learn and improve their management skills.

3. Investment in management development can have a direct economic benefit to the organization.
4. Organizational development creates a constant pattern of improvement in which strategies are developed, evaluated, implemented, and assessed for results and quality.

Conclusion

Human resource development helps organizations develop their workforce through employee training and career development which improves organizational effectiveness and performance. Organizations have many opportunities for human resource development, both within and outside of the workplace. Human resource development can be formal or informal.

Entrepreneurial qualities are essential for an entrepreneur to succeed in their business ventures. There are huge prospects available in Different fields. The Entrepreneur has to select right area of his own interest. Entrepreneurial performance is determined by the environment and the individual capacity and will to deal with the environment. Organizational development and management are crucial for the growth and success of an organization. Organizational development enhances the skills and abilities of leaders and managers, while management development helps managers learn and improve their management skills. Organizational development creates a constant pattern of improvement in which strategies are developed, evaluated, implemented, and assessed for results and quality. For organizational development, entrepreneurial characters and behaviour need to be upgraded from time to time through Human Resource Development.

References

https://papertyari.com/general-awareness/management/human-resource-development/

https://www.slideshare.net/col.vishal/entrepreneurship-opportunities-in-india

Human Resource Development | Overview, Functions & Role - Video & Lesson Transcript | Study.com

Qualities Of Entrepreneurs (smallbusinessify.com)

Katakwar "Entrepreneurship development in India : Challenges and Opportunities" International Journal Of Science, Engineering and Management (IJSEM) Vol 2, Issue 7, July 2017 ISSN (Online)2456-1304.

Shyam Patidar "Opportunities Available for Entrepreneurs in India" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 p-ISSN:2395-0072.

LP 6.5

Agri-preneurship through Oyster Mushroom cultivation

R. S. Jaiman, D. B. Patel, Jotika Purohit, V. M. Jitaliya and E. Premabati Devi
C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar-385506
Email: jaimanrs74@sdau.edu.in

Introduction

Oyster mushroom (*Pleurotus* spp.) belonging to class Basidiomycetes and family Agaricaceae is popularly known as "dhingri" in India and grows naturally in the temperate and tropical forests on dead and decaying wooden logs or sometimes on dying trunks of deciduous or coniferous woods [nhb.gov.in] . On commercial ways for the economical an edible purpose people grows it on the preparing the substrate of organic matter. The fruiting bodies of this mushroom are distinctly shell or spatula shaped with different shades of white, cream, grey, yellow, pink, light brown depending upon the species (Singh and Chaube, 1995) . According to a report by the National Horticulture Board of India, the production of oyster mushrooms in India has increased significantly in recent years, with a total production of 37,345 metric tons in 2018-2019. This represents a significant increase from the production of 8,977 metric tons in 2010-2011. Widely grown species of Oyster Mushroom in India are listed below,

- *Pleurotus ostreatus*
- *Pleurotus florida*
- *Pleurotus sajor-caju*
- *Pleurotus sapidus*
- *Pleurotus pulmonarius*
- *Pleurotus membranaceous*
- *Pleurotus flabellatus*

They are the most preferred ones among the edible mushrooms due to their ability to grow quickly and productively in various lignocellulosic media (Change and Miles, 2004), their versatility, and absolute ease of cultivation and their nutritional value especially as source of protein (Glazer and Nikiado, 2007). They are cultivated throughout the world for producing flavouring and aromatic as well as medicinal stuff; lignin and phenol degrading activities; antimicrobial activities and antioxidants; immune enhancing activities and producing secondary metabolites like terpenoids, alkaloids, and phenols. The medicinal properties and activities of *Pleurotus* species is compiled by Patil and coworkers (Frimpong-Manso *et al.* 2011). Raw dietary mushrooms are good sources of B vitamins (such as thiamine, riboflavin, niacin, and pantothenic acid), vitamin C, zinc, calcium, phosphorus, potassium, sodium, carbohydrates, proteins, and fats (Bhanu *et al.* 2001) and are becoming more popular. Mushrooms and/or their extracts are also used in medications, biological remediation, bio-degradable packaging, dyeing wool, etc.

Mushroom cultivation offers ample opportunities by turning agro-industrial wastes into new forms of resources and protein-rich food by biodegradation, bioremediation, and biotransformation. This is because mushrooms are excellent converters of cheap cellulosic materials into valuable proteins. In fact, many studies have shown that agro-industrial effluents are outstanding supplements that shorten crop period and increase mushroom productivities of oyster species (Gothwal *et al.* 2012).

Indoor mushroom biofarm by using cheaply and amply available substrates coming from agricultural, industrial, forestry, and domestic wastes and by exploiting all available horizontal and vertical space helps us produce the highest protein per unit area. Protein yield of indoor mushroom biofarm is estimated to be greater than 100 times compared to the yield of conventional agriculture or animal husbandry, small-scale entrepreneurs, and (c) assisting efforts of biotransformation of various wastes (Salmones, *et al.* 2012). This

paper reports the oyster mushroom cultivation developing a cultivation simple mushroom biofarm, for home-based and small/medium-scale producers. The consumer market for oyster mushrooms is being developed by the larger mushroom companies as they diversify their operations. However, because of the short shelf life of many oyster mushroom varieties, this species may offer a special advantage to the local grower who markets directly and can consistently deliver a fresh, high-quality product. Small-scale mushroom production represents an opportunity for farmers interested in an additional enterprise and is a specialty option for farmers without much land.

Cultivation technology

The procedure for oyster mushroom cultivation can be divided into following four steps (Tewari and Sharma, 2010):

i. Preparation or procurement of spawn
ii. Substrate preparation
iii. Spawning of substrate
iv. Crop management

Mushroom production systems in India

The mycoculture history in India is about five decades old (Verma, 2007). The mushroom cultivation systems in the country are summarizes as under:

Marginal grower's cropping system

The mushroom cultivation is strictly a seasonal activity and farmers are taking 1-3 crops per season as per the availability of desired temperatures. Locally available agrowastes and other raw materials are used as substrate. Cropping rooms are made-up of local tree/grass materials like bamboo, sugarcane leaves and rice straw etc. The shelves or racks are constructed using bamboo, plywood, twigs, *sarkanda* etc.

Small grower's cropping system

A large number of mushroom growers are taking seasonal crops of mushroom by converting their older buildings into mushroom crop rooms or inside specially constructed crop rooms (40'x20'x12') for the purpose. Depending upon prevailing temperatures, 1-3 crops are taken per season.

Big grower's or industrial scale cropping system

Big growers are mainly export oriented units with their own canning or processing and spawn production units.

However, the location specific technological interventions for growing specialty mushrooms will be very helpful in increasing the income of farmers, generating round the year employment and finally livelihood security which are main concerns with resource poor small and marginal farmers. Apart from its easy and low cost cultivation, it is having a good way for various business opportunities.

The potential of mushroom cultivation in India

Nutritional values of mushrooms

Indian diet is primarily based on cereals (wheat, rice and maize), which is deficient in protein. Supplementation of mushroom recipe in Indian diet will bridge protein gap and improve the general health of socio-economically backward communities. Earlier mushrooms were considered as an expensive vegetable and were preferred by affluent peoples for culinary purposes. Currently common populace also considers mushroom as a quality food due to its health benefits. Mushroom is considered to be a complete, health food and suitable for all age groups, child to aged people. The nutritional value of mushroom is affected by numerous factors such as species, stage of development and environmental conditions. Mushrooms are rich in protein, dietary fiber, vitamins and minerals. The digestible carbohydrate profile of mushroom includes starches, pentoses, hexoses, disaccharides, amino sugars, sugar alcohols and sugar acids. The total

carbohydrate content in mushroom varied from 26-82% on dry weight basis in different mushrooms (Change and Miles, 2004). The crude fiber composition of the mushroom consists of partially digestible polysaccharides and chitin. Edible mushrooms commonly have insignificant lipid level with higher proportion of polyunsaturated fatty acids. All these result in low calorific yield from mushroom foods. Mushrooms do not have cholesterol. Instead, they have ergosterol that acts as a precursor for Vitamin D synthesis in human body. Similarly, ergosterol in button mushroom is converted in to vitamin D_2 when exposed to UV radiation or sunlight. The protein content of edible mushrooms is usually high, but varies greatly. The crude protein content of mushrooms varied from 12-35% depending upon the species. The free amino acids composition differs widely but in general they are rich in theronine and valine but deficient in sulphur containing aminoacids (ethionine and cysteine). Mushrooms comprise about 80-90% of water, and 8- 10% of fiber. In addition to these, mushroom is an excellent source of vitamins especially C and B (Folic acid, Thiamine, Riboflavin and Niacin). Minerals viz., potassium, sodium and phosphorous are higher in fruit bodies of the mushroom. It also contains other essential minerals (Cu, Zn, Mg) in traces but deficient in iron and calcium (Caglarirmak, 2007). Hence, they can considered as super food with ample of nutrients.

Medicinal values

Since thousands of years, edible fungi have been revered for their immense health benefits and extensively used in folk medicine. Specific biochemical compounds in mushrooms are responsible for improving human health in many ways. These bioactive compounds include polysaccharides, tri-terpenoids, low molecular weight proteins, glycoproteins and immunomodulating compounds. Hence mushrooms have been shown to promote immune function; boost health; lower the risk of cancer; inhibit tumor growth; help balancing blood sugar; ward off viruses, bacteria, and fungi; reduce inflammation; and support the body's detoxification mechanisms (Bhanu *et al.,* 2001). Increasing recognition of mushrooms in complementing conventional medicines is also well known for fighting many diseases.

Round-the-year cropping

In contrast to field crops, mushroom production can be done round the year, since they do not require sunlight and are cultivated indoors under controlled conditions and not exposed to climatic variations outdoors. There are different species of mushrooms fitted to different climatic conditions of various locations of India

Value added products of mushroom

Fresh mushrooms can be used to produce a variety of value added products like pickles, jams,sauces, candies, chips, while, dried mushrooms can be used to manufacture products like instant soup mixes, bakery goods, papad and nuggets.

Mushroom production modules

Mushroom cultivation involves a number of operations. While, some big growers undertake all the required operations, others are involved in only one operation or one step of the entire production cycle (Wakchaure, 2011). Some culture collection units provide culture only, spawn (seed) production units involved only in mass production of spawn, and some units produce compost (substrate) only. Some of the prevalent and possible modules are may be as follows:

1. Culture producers --------Spawn producers ---------Compost/substrate producers----------
   Crop growers-------- mushroom sellers
2. Culture and spawn units---------- composting, growing and marketing units
3. Spawn producers ----------compost producers ----------growing and marketing
4. Spawn and substrate producers---------- individual/co-operative grower and seller

Further each of above activities of mushroom production has the full time employment and income generation potential (Singh, 2011).

Mycoculture activities as separate enterprise

1. Culture production units
2. Mushroom marketing units
3. Spawn production units
4. Mushroom growing units
5. Compost/substrate producers

Economics of Oyster cultivation

Sr. No.	Individuals	Quantity	Cost (Rs.)
1.	Straw	10 kg	100
2.	Spawn	500 gm	60
3.	Formalin 37.5%	125 ml	55
4.	Carbendazim 50WP	7.5 gm	05
5.	Plastic Bags	2 No.	02
6.	Others		100
		Total Cost (For 10 Kilos of Straw Used)	322
		Mushroom Production from 10 kg of Straw	10-12 kg
		Average market Price of Oyster Mushroom	150-200 Rs
		Total Income	**1500-200 Rs**

Mushroom production systems for India

In India the possible agri-systems which include mushroom production may be the followings:

1. **Agri-mycoculture system**: involves field crops+ mushroom production (for most of farmers)
2. **Agri-horti-mycoculture system**: involves field crops+ fruit crops+ mushroom production (for most of farmers)
3. **Silvi-mycoculture system**: involves forest crops+ mushroom production (for tribal areas)
4. **Agri-horti-silvi-mycoculture system**: involves field crops+ fruit crops + forest crop + mushroom production (for technically skilled farmers having agri-horti-silviculture and organic production system)
5. **Agri-horti-silvi-myco-vermiculture system**: involves field crops + fruit crops + forest crop+mushrooms+vermicompost production (for organic farmers)

Conclusion

According to this worldwide survey, different kinds of wastes have been proven to be useful for oyster mushroom growing. So, every grower producing oyster mushrooms can make their own best substrate choice from among all those genera or species. The substrates may be useful in the production of a valued protein rich food. The mushroom production is increasing and making a significant impact on the economy of countries that engage in its cultivation. Mushrooms are cultivated in both small-scale and large-scale farming, Cultivation of oyster mushroom on various agricultural residues offers economic initiatives for agribusiness. This has encouraged investigating the effect of substrate supplementation on sustained yield of edible mushrooms in various harvests with regards to commercial production. Growing mushrooms gives so much satisfaction and produces so much food and income that further use of this practice can result in a great complete contentment of families and villages.

Hence, it is encouraging and incentivizing citizens, especially the educated youth, to initiate knowledge-based micro and small businesses. Also, the governments are working towards ensuring and sustaining food and nutrition security at household and national levels through increasing production and productivity and

diversifying the produces. And yet, there is a growing demand for mushroom in many urban and semi-urban areas provides an open opportunity for home-based as well as small- and medium-scale entrepreneurs by involving in different mycoculture activities.

Reference

A. N. Glazer and H. Nikaido, *Microbial Biotechnology: Fundamentals of Applied Microbiology*, Cambridge University Press, New York, NY, USA, 2nd edition, 2007.

Bhanu, C.; Kushwaha, K.P.S. and Singh, R.P. (2001). Medicinal values of mushroom. *Intensive Agriculture*. XXXIX (3-4): 9-11.

Caglarirmak, N. 2007. The nutrients of exotic mushrooms (*Lentinula edodes* and *Pleurotus* species) and an estimated approach to the volatile compounds. *Food Chem.*, 105: 1188–1194.

J. Frimpong-Manso, M. Obodai, M. Dzomeku, and M. M. Apertorgbor, "Influence of rice husk on biological efficiency and nutrient content of *Pleurotus ostreatus* (Jacq. Ex. Fr.) Kummer,"*International Food Research Journal*, vol. 18, no. 1, pp. 249–254, 2011.

R. Gothwal, A. Gupta, A. Kumar, S. Sharma, and B. J. Alappat, "Feasibility of dairy waste water (DWW) and distillery spent want (DSW) effluents in increasing the yield potential of *Pleurotus flabellatus*(PF 1832) and *Pleurotus sajor-caju* (PS 1610) on bagasse," *Biotechnology*, vol. 2, no. 3, pp. 249–257, 2012.

S. T. Change and P.Miles, *Mushrooms: Cultivation, Nutritional value, Medicinal Effect and Environmental Impact*, CRC Press, New York, NY, USA, 2nd edition, 2004.

Salmones, D., G. Mata, K.N. Waliszewski, 2005. Comparative culturing of *Pleurotus* spp. on coffee pulp and wheat straw: biomass production and substrate biodegradation. Bioresourse Technol., 96(5): 537-544.

Singh, M. (2011). Mushroom Production: An Agribusiness Activity. *In*: Mushrooms: Cultivation, Marketing and Consumption (Eds. Manjit Singh; Bhuvnesh Vijay; Shwet Kamal and Wakchaure, G.C.). Directorate of Mushroom Research, Solan, India.pp:1-10.

Singh, R.P. and Chaube, H.S. (1995). Mushroom Production Technologies. G.B. Pant University of Agric. and Technology, Pantnagar, India.104p.

Tarafdar, J.C. and Yadav, B.K. (2009). Residue management and composting. *In*: Organic agriculture (Eds. J.C. Tarafdar; K.P. Tripathi and M. Kumar). Scientific Publisher, Jodhpur, India.Pp-52-71.

Tewari, R.P. and Sharma, V.P. (2010). Mushroom Production: Agrowastes Utilization and Creating Employment. *In*: Recent Initiatives in Horticulture (Eds. K.L. Chadha; A.K. Singh and V.B. Patel). Westville Publishing House, New Delhi. pp-297-305.

Verma, R. N. (2007). Mushroom based eco-farming –a road map to sustainable agriculture and rural prosperity in India. *In*: Mushroom biology and Biotechnology (Eds. R.D. Rai, S.K. Singh, M.C. Yadav and R.P. Tewari). Mushroom Society of India, DMR, Solan, India. pp-367-373.

Wakchaure, G. C. (2011). Production and marketing of mushrooms: Global and National Scenario. *In*: Mushrooms: Cultivation, Marketing and Consumption (Eds. Manjit Singh; Bhuvnesh Vijay; Shwet Kamal and Wakchaure, G.C.). Directorate of Mushroom Research, Solan, India.pp:15-22.

ABSTRACT

Innovative Extension Approaches, Agricultural Marketing Reforms and Policies (IEA)

IEA 1

Motivational factor and constraints in adoption of potato cultivation technology by potato growers under contract farming

H. K. Desai[1], K. A. Thakkar[2] and J. D. Desai[3]
[1]Research Associate, Tribal Research cum Training Centre, AAU, Devgadh Baria
[2]Ex-Director of DEE, S.D. Agricultural University, Sardarkrushinagar, 385506
[3]Assistnat Extension Educationist, DEE, Anand Agricultural University
Email: harshdeasi51@gmail.com

ABSTRACT

Most of the farm operators being small and marginal farmers in India, there are problems in getting quality raw material for processing, marketing, and distribution, especially in perishable high value crops but contract farming which was restricted, largely, to seed production earlier, spread to perishable produce and has now become the dominant and growing mode of raw material production and procurement co-ordination among the processors and fresh produce market and exporters. Potato is very important perishable high value crop in North Gujarat with the cultivating area of 97,204 hector Two districts of North Gujarat *viz*., Banaskantha and Sabarkantha occupy the highest area under potato cultivation and hence, were selected purposively for the study. Ten potato growers were randomly selected from twenty villages. In all, 200 contract potato growers were selected for the study. Important motivational factors farmers toward contract farming were; assured price, price stability, no tension of marketing, technical advice to control pests and diseases, no cash payment for seed. Majority (78.00%) of the potato growers had medium to high level of adoption regarding potato cultivation technology. Major constraints faced by potato growers in adoption of potato cultivation technology under contract farming were; high rejection rate, low contract price, high cost of inputs given by contracting company, poor quality seed supply by company and manipulation of norms by firm. Important suggestions expressed by the potato growers were; provision of supportive price, quality seed to be provided by company, government intervention for making strict laws to make legal contracts and technical advice to control pests and diseases.

IEA 2

Relationship between profile of FIGs members and their task functioning of ATMA Project

C. B. Damor[1], D. M. Rathod[2] and G. D. Hadiya[3]
[1] and [3]Assistant Research Scientist, Agricultural Research Station, AAU, Derol -389320 India
[2]Assistant Research Scientist, Main Maize Research Station, AAU, Godhra -389001 India
Email: cbdamor@aau.in

ABSTRACT

The Agricultural Technology Management Agency (ATMA) has now become the most important institutional mechanism at the district level for the implementation of agricultural extension reforms. Multistage random sampling technique was followed for the selection of district, talukas, villages and FIG members of ATMA. Panchmahals district comprises 7 talukas out of these, 4 talukas Godhra, Halol, Kalol and Sahera selected purposively. A total of 300 FIG members were selected and interviewed. More than half (54.67 %) of the FIGs members were found in the middle age group, more than half (55.67 %) of the FIGs members had secondary to higher secondary level of education, more than half (52.67 %) of FIGs members had a medium to high level of farming experience, more than three-fifth (62.67 %) of the FIGs members had a medium to high level of training received, slightly more than two-third (68.33 %) of the FIGs members had medium to high cohesiveness, more than three-fifth (64.00 %) of the FIGs members had medium to high level

of task functioning, education, experience in farming, experience in FIGs, exposure visit, social participation, training received, annual income, cohesiveness had positive and highly significant correlation with task functioning.

IEA3

Growing together: Empowering farmers through FPOs, FOs, and cooperatives

Umang B. Patel[1], J. B. Delvadiya[2], Meera Padaliya[3] and Hiral M Patel[4]
N. M. College of Agriculture, NAU, Navsari
Email**:** patelumang4372@gmail.com

ABSTRACT

FPOs, FOs, and cooperatives are pivotal for farmer empowerment through collective action, improved market access and sustainable practices. FPOs, owned by farmers, enable aggregated production, better pricing and easier credit access. They empower farmers via skill-building and advanced techniques. FOs unites farmers for advocacy, amplifying their voices for policy changes and enhanced market infrastructure. Cooperatives promote resource-sharing, risk reduction and equitable benefits distribution, levelling the field for marginalized farmers. They provide credit, inputs and technology, fostering inclusivity and cohesion. Together, these entities drive rural development, reducing exploitative intermediaries, enhancing profits and promoting sustainable farming. They bolster food security, environmental stewardship and resource efficiency. In conclusion, FPOs, FOs, and cooperatives are transformative in agriculture, fostering collaboration, knowledge exchange and resource optimization. They empower farmers economically, socially and politically, enhancing resilience and capitalizing on opportunities in a dynamic agricultural sector.

IEA4

Farmer's knowledge about digital marketing of agricultural commodities in Haryana

S. R. Verma[1], Veer Sain[2] and Sumit[3]
[1]Assistant Professor (Agril. Extension), [2] and [3]Assistant Professor (Agril. Economics)
CCS, HAU, College of Agriculture, Kaul (Kaithal) Haryana
Email: verma.vermasr@gmail.com

ABSTRACT

Present era is termed as digital marketing era. The growth of digital marketing is now estimated to grow up to 539 billion by end of 2024 which certainly indicates a huge digital marketing growth in India. Digital marketing is booming in the country like India where millions of mobile phones and social media users are densely populated. Today India believes that digital marketing is the lifeline of businesses. Indian farmers are facing the problem of marketing their products beyond their locality therefore, digital marketing can be the best possible solution for this problem but farmers are taking less advantage of digital marketing as compared the other sectors. The reason behind it may be lack of knowledge and awareness about the digital marketing among the farming community. To investigate this issue present study was planned with the objective to assess level of knowledge of farmers about digital marketing of agricultural commodities. The study was conducted in four blocks of Kaithal and Kurukshetra districts of Haryana. Total eight villages were selected for the study from the four blocks. For respondent selection ten progressive farmers and agripreneurs from each village were selected randomly. Thus, in all 80 farmers were included in the sample of study. To measure the knowledge level of farmers about digital marketing the knowledge index was calculated. The results of the investigation show that the knowledge of the farmers about various aspects of digital marketing was not sufficient. The knowledge of the farmers about 'E-NAM online marketing platform'; 'Website/web portals facilitate digital marketing'; 'Online marketing of agricultural commodities through Facebook page was less

than 25 percent that is insufficient for doing online marketing of agricultural commodities. The average of knowledge scores was found 25.97 MPS which is really poor and needs to be upgraded for promoting digital marketing among the farmers.

IEA5

Attitude of stakeholders towards agricultural innovation system

P. H. Vihariya[1], K. V. Gardhariya[2] and R. D. Pandya[3]

[1] and [2] Research Associate, Extension Education Institute, AAU Campus, Anand-388110

[3]Rtd. Principal & Dean NMCA, Navsari Agricultural University, NAU, Navsari

Email: payal14.vihariya@gmail.com

ABSTRACT

Attitude is the degree of positive or negative feeling associated with some psychological object. In present study, it is conceptualized as positive or negative feelings of the stakeholders towards AIS. This infers that the AIS generates a lot of hope for innovative technologies and interactive learning among stakeholders to overcome the weak linkages among them. This may play an important role to enhance the potential of stakeholders by generating, diffusing and showing application of new knowledge among the intended people. The present study was carried out in seven districts of South Gujarat. The six types of stakeholder were playing pivotal role in AIS hence the list of each type of stakeholders was obtained from the concerned authorities. A simple random sampling method was adopted to obtain respondents sample size. Thus, 30 researches, 50 extensionists, 30 In-charge of NGOs, 30 managers of private agencies, 50 owner of agro-service providers and 50 progressive farmers were selected. All the 240 stakeholders were randomly selected. The statistical tools and method was used to analyse the data were frequency, percentage and arbitrary method. It can be concluded that more than half (56.67%) of the stakeholders had highly favourable, followed by 35.42 and 7.91 per cent of them had favourable and less favourable attitude towards AIS respectively. Thus, it can be said that overwhelming majority (92.09%) of the respondents had favourable to highly favourable attitude towards AIS.

IEA6

Approaches to manage post harvest losses and value addition

Mehnaz Mehfuza[1] and Ashutosh Kumar[2]

[1] M.Sc. (Agricultural Extension & Communication) B.A.C.A, AAU, Anand

[2] MBA (ABM) International Agri-Business Management Institute, AAU, Anand

Email: mehnazmehfuza00@gmail.com

ABSTRACT

While there is huge demand of food for providing food security to ever increasing population of world, almost 30% food is wasted during post harvest handling. As per recent government data, the farmers of India suffered post harvest loss of 1,52,000 crores in year 2022. Food is wasted in every stage in supply chain from farmer's field, in warehouses, in middlemen's shop as well as during time of consumption by consumers. Some of the major techniques of post harvest management are grading, pre-conditioning, curing, packaging, scientific storage, transportation and efficient distribution. Proper training of farmers about time of harvesting, scientific drying as well as processing need to be given to minimise after harvest losses. As perishability is dominant factor in agriculture commodities, use of scientific storage can be one of the best tools for improving self life and decreasing losses. It is found that due to scientific storage the wastages of agricultural produce can reduce from 30 percent to 2 percent. The value addition is one of the best tools for reducing post harvest losses, increasing self life as well as creating utility of product. Presently value addition is done in every allied sector of agriculture like horticulture, fisheries, dairy as well as forestry sector. The

value addition not only helps in increasing demand of agricultural product but also helps in preservation and thus enhancing the income of producers. Also according to recent government data, there is high demand of popped up products, fish products and other value added agricultural products from India in western countries thus generating large foreign reserve. So, to achieve food security and enhanced income of players involved in this sector, the wastages need to be minimised through proper post harvest management and value addition.

IEA 7

Comparing the impact of Farmer Producer Organizations (FPOS) on agriculture in South Gujarat: Company Act vs. Cooperative Act

Maulika Patel[1], Keyur Gardhariya[2] and R. D. Pandya[3]

[1]Agriculture Officer, Training & Visit branch, Directorate of Agriculture, Krushibhavan, Sector-10/A, Gandhinagar, Gujarat

[2]Research Associate, Extension Education Institute, Anand, Gujarat

[3]Rtd. Principal & Dean, NMCA, NAU

Email: maulipatel8140117127@gmail.com

ABSTRACT

The Farmer Producer Organization is an organized body of small and marginal farmers, agricultural producers, and rural artisans that are formed with an aimed to increase their collective bargaining power and to enable them to take collective action on matters related to their production, marketing, and other activities. Ex-post-facto research design was used in the present study. This study covered all seven districts in South Gujarat, randomly selecting 20 FPOs registered as companies and 20 as co-operatives. Each FPO contributed one CEO, five Board of Directors and 5 farmers, totalling 440 (200 Farmers+40 CEOs+ 200 BODs) respondents from 40 FPOs. The present study concluded that the personnel and farmer members of companies act FPOs had achieved the significant change in annual income, modern technology based farm machinery and implements, household items, savings/ investments, standard of living, social status however change in cost of works adversely which resulted in reduction of cost of cultivation after joining the FPOs. Hence, the FPOs registered under company act have had significant impact on its members. However, the members of FPOs under co-operative society act hadn't achieved a significance change in all the aspects. In context of companies FPOs majority (84.17%) of the personnel had medium to high level of impact of FPOs, respectively. In case of farmer members, majority (92.00%) of the farmer members had medium to low level of impact of FPOs. In context of co-operative FPOs, a vast majority (86.66%) of the personnel and a vast majority (97.00%) of the farmer members had low to medium level impact of FPOs.

IEA 8

Development and standardization of media packages on consumer rights and certification mark for rural consumers of Deesa taluka

U. S. Panasara[1], Serene Shekhar[2] and J. N. Vyas[3]

[1]Post Graduate Student, [2]Assistant Professor, Department of Extension Education & Communication Management, ASPEE College of Nutrition & Community Science; SDAU,

[3]Senior Scientist and head KVK Nana Kandhasar, JAU

ABSTRACT

Consumers are the largest economic group in country. Consumers have the right to have information about the quality, potency, quantity, purity, price and standard of goods or services, as it may be the case, but the consumer is to be protected against any unfair practices of trade. The present study aims to development and standardization of media package on consumer rights and certification mark. A representative sample of

15 respondents from each village (total=60) was selected by following random sampling procedure. Descriptive statistics, paired 't' test, two sample 't' test and correlation analysis was used for analysis of data. The overall evaluation of different aspects of visual aid, audio aid and audio-visual aid by experts for each parameter was found to be between 2.50 to 2.95; 2.35 to 2.95 and 2.50 to 2.97 respectively. When pair-t test was administered, the gain in awareness among the respondents was found to be highly significant. The result revealed that there was significant difference between pre and post awareness regarding consumer rights and certification mark. Awareness about consumer rights, certification mark showed positive and highly significant association with caste category (r=0.457**) at 1 per cent level while age of respondents (r=0.294*) and education (r=0.275*) showed positive and significant association with awareness about consumer rights and certification mark at 5 per cent level.

IEA 9

Knowledge and attitude of agricultural enterprise owners towards private extension services

Keyur Gardhariya[1], M. J. Patel[2] and R. D. Pandya[3]

[1]Research Associate, EEI, Anand, [2]Agriculture Officer, Krushi Bhavan, Gandhinagar

[3]Rtd. Principal & Dean, NMCA, NAU

ABSTRACT

The 21st century marks a transformative era for Indian agriculture. Farmers are pursuing economic gains, seeking more profitable ventures. Agricultural extension aims to foster change and growth in this sector. Private extension services are demand-driven, timely, and cost-efficient, emphasizing maximum returns from minimal inputs. The study was conducted to know the knowledge and attitude of agricultural enterprise owners towards Private Extension Services. An enterprise has been selected from each occupation based on presence of private extension services *viz.*, vermi-composting, nursery, bee-keeping, poultry and prawn. The 25 respondents were selected randomly from each enterprise which made the respondents size of 125 for the study. An ex-post-facto research design was used. The data were collected by personal contact. Majority (67.20 %) of the respondents had medium and 32.80 per cent had high level of knowledge about Private Extension Services. Whereas, majority (56.00 %) of the agricultural enterprise owners had favourable attitude, followed by 42.40 and 1.60 per cent had more favorable and less favourable attitude towards Private Extension Services respectively.

IEA 10

Knowledge and attitude of farmers about doubling farm income strategies

R. B. Rathod[1], P. B. Khodifad[2] and A. B. Dhola[3]

[1]Senior Research Fellow, Extension Education Institution, AAU, Anand – 388110

[2] Assistant Professor, Department of Extension Education, NMCA, NAU, Navsari

[3] Ph.D. Scholar, Department of Extension Education, CPCA, SDAU, Sardarkrushinagar

Email: rrb4289@yahoo.com

ABSTRACT

Agriculture has been and will continue to be the life line of an Indian economy. Economic growth of the country largely dependent on agriculture. After independence, India experienced an impressive growth and productivity gains in agriculture. Despite production and productivity in agricultural increased, economic condition of the farmers not improved in that order. A study was conducted in Navsari district of Gujarat state. Ex-post-facto research design was followed. Identification of strategies for doubling farm income indicated that there were five major strategies for doubling farm income viz; production and productivity enhancement, farming cost reduction, farm produce price maximizing, minimizing post-harvest loss of farm produce and

non-farm income generating strategies. The results of the study revealed that the majority 74.00 per cent of the farmers had medium level knowledge and majority 58.66 per cent of the farmers had neutral attitude about strategies for doubling farm income.

IEA 11

Innovative chilli and muskmelon intercropping module for resource conservation and higher profitability

Y. D. Pawar, V.V. Prajapati and Rakesh N. Patel
S. D. Agricultural University, Deesa
Email: yogesh517.pawar@gmail.com

ABSTRACT

Land fragmentation is also biggest issue in Deesa pocket of Banaskantha district. Thus, to combat this situation, Krushi Vigyan Kendra, Banaskantha-I, innovated and tested intercropping module of chilli + muskmelon (1:2) on plastic mulch with drip irrigation during summer season on farmers field. Results of the study revealed that, chilli produced 248.58 q/ha and 233.75 q/ha green fruit yield and muskmelon produced 290.28 q/ha and 302.60 q/ha of fruit yield in intercropping system during the year 2018 and 2019, respectively. Crop equivalent yield was 373.87 q/ha and 364.37 q/ha with 1.80 and 1.81 land equivalent ratio during 2018 and 2019, respectively. Economical point of view, intercropping system earned gross income Rs. 10.39 and 10.12 lakh/ha with net return of Rs.7.87 and Rs.7.51 lakh/ha and BCR 4.12 and 3.88 during the year 2018 and 2019, respectively. From the present investigation it is concluded that CMI module (Chilli and muskmelon intercropping) (1:2) could be promising in terms of efficient resource utilization, reduce cost as well as abiotic stress and higher productivity with more revenue generation. This module has gained very much popularity within a short time among the farmers and covered 566.92 hectare area in one year.

IEA 12

Paying behaviour of agricultural enterprise owners towards private extension services of South Gujarat

Keyur Gardhariya[1], P. H. Vihariya[2] and R. D. Pandya[3]
[1]and [2] Research Associate, EEI, Anand
[3]Rtd. Principal & Dean, NMCA, NAU

ABSTRACT

In the 21st century, Indian agriculture is undergoing significant transformation as farmers seek more profitable opportunities. Agricultural extension is driving change and development in the sector, with the emergence of private sector extension services since the 1990s. These services, offered by agricultural consultants, agri-business firms, mass media, and NGOs, are demand-driven, timely, and cost-effective. They promote the idea of achieving higher returns with minimal inputs, encouraging a more financially savvy approach among farming communities. An enterprise has been selected from each occupation based on presence of private extension services *viz.*, vermi-composting, nursery, bee-keeping, poultry and prawn. The 25 respondents were selected randomly from each enterprise which made the respondents size of 125. An ex-post-facto research design was used. The majority enterprise owners had medium knowledge and favourable attitude, low willingness to pay, moderately satisfied and medium level of paying behaviour towards PES. They prefer fixed charged on agricultural produce as payment mechanism and net backing as a mode of payment. The education, family income, social participation, credit seeking behaviour, innovativeness, economic orientation and management efficiency had highly significant correlation with the paying

behaviour of agricultural enterprise owners. While, land holding, information seeking behaviour, self-confidence, risk orientation and knowledge about enterprise were having significant correlation with paying behaviour of agricultural enterprise owners.2

IEA 13

Perception of tribal farmers towards Pradhan Mantri Van Dhan Vikas Yojana in East Godavari district of Andhra Pradesh

Tummala Naga Satya Sai Srivani[1], Parvez Rajan[2] and D. A. Padaliya[3]

[1] & [3]Ph.D Scholar, College of Agriculture, JAU, Junagadh and

[2]Assistant Professor, College of Agriculture, JNKVV, Jabalpur

Email: tnsssrivani@gmail.com

ABSTRACT

Pradhan Mantri Van Dhan Vikas Yojana (PMVDVY) scheme was launched on 14th April 2018 which is an initiative of Ministry of Tribal Affairs at central level and TRIFED as nodal agency at the national level. This scheme is one such effort of the government to improve the tribal livelihood and tribal income through value addition of various tribal products and to make them self-reliant especially the tribal women. The present study was conducted in East Godavari district of Andhra Pradesh state during 2021-22. The study was undertaken to assess the perception of beneficiaries towards PMVDVY, in which total 105 sample size was taken by using proportionate random sampling method in 8 villages under 2 mandals. The findings of the study revealed that, majority of the beneficiaries were of young age group, belonged to female gender. The study also revealed that most of them are illiterates, having low annual income, small land holdings, majority of the beneficiaries had medium level of utilization of source of information, with medium economic motivation and market orientation. Then coming to the perception of beneficiaries towards PMVDVY was found favourable. Based on the findings of the study, it can be concluded that PMVDVY helps the beneficiaries especially women to improve their livelihoods, economic conditions and thereby made them self-reliant.

IEA 14

Repayment behaviour of crop loan borrowers of Sabarkantha District Central Co-Operative Bank in Gujarat

R. K. Joshi, K. P. Thakar and Soumya C

Department of Agricultural Economics, C.P.C.A., S.D.A.U., Gujarat

Email: rahuljoshi141@gmail.com

ABSTRACT

Credit has an immense role in Indian economy and in the development of the country. Rural credit system plays an important role in the economic development of farmers because they have inadequate savings to finance farming and other economic activities. Since Independence, cooperative banks which work on cooperative principles have played an important role in the development of rural economy in India. For the study, primary data was collected from selected branches of Sabarkantha District Central Co-operative Bank and their borrowers of Aravalli district who obtained crop loan during the year 2018-19. The study revealed that the maximum number of borrowers, i.e. 59.00 per cent was found in the middle age group. Majority of the borrowers who borrowed credit for crop production was more related to the literate group and belonged to the medium size family. Study also revealed that majority of the borrowers have medium level of experience in the farming and belonged to the low-level income group. The study showed that higher numbers of borrowers, i.e., 35.83 per cent were semi - medium farmers and maximum number of the farmers

borrowed less than ₹ 1, 00, 000 per farm. The study also reported that maximum numbers of borrowers, i.e., 54.17 per cent borrowers belonged to low amount borrowed category and were found to have to have medium level of cropping intensity in the farm. The study also showed that maximum number of borrowers, i.e. 44.17 per cent was found to have medium level of irrigation potential. The land use pattern showed that while comparing operated area *kharif* crops were dominant. It was found out that the farmers have generated gross return of ₹ 2,36,426 per farm in production of maize, wheat and groundnut and the farmer (credit need) took loan with ₹ 1,03,034 per farm for the same purpose. After clearing the loan which indicates his credit worthiness the repayment capacity stood at 35,203.

IEA 15

Saving and borrowing pattern of farmers

Simple Jain, Pragaya Dashora and Neeta Khnadelwal

ASPEE College of Nutrition and Community Science, SDAU, Sardarkrushinagar, Gujarat

ABSTRACT

The savings and borrowings pattern differs from person to person as per the amount of money that they earn. The earning depends on the occupation of the person. If the person has continuous source of income then he/she can save more and borrow less. In reality, they are able to save very less money due of lack of funds and they borrow money to fulfil their basic and other needs. They have limited access to formal financial institutions that leads to dependency on informal borrowing sources such as money lenders to meet out the financial requirements which make them poorer and debted. The present study was undertaken to find out the saving and borrowing pattern of farmers of Banaskantha district of Gujarat. The study was conducted in three talukas of Banaskantha district of Gujarat. Three villages from each taluka and ten women and ten men from each village were selected randomly. So, the total sample was 180 rural people including 90 women and 90 men. Interview technique was used for collecting data from the respondents. Data was analyzed by using frequency, percentage, mean score and correlation. The findings reveal that all the respondents tried to save money but due to less income they couldn't save much. Majority of the respondents (72.2%) could be able to save very little amount of their income which is less than 10%. Rural people preferred to invest money in post office saving schemes, buying land and buying precious metal i.e gold and silver which involves less risk. Besides small saving they needed to borrow money from time to time to fulfil their basic needs. This might be due to inflation and low income. Male respondents were more aware of saving and borrowing schemes and government programmes except one scheme that is SHG-bank linkage programme where women had more knowledge than men.

IEA 16

Profile of respondents in management of primary dairy cooperatives in South Gujarat

R. M. Naik[1], K. L. Chaudhary[2], P. B. Khodifad[3], O. P. Sharma[4] and R. D. Pandya[5]

[1]Principal and Dean, [2]Assistant Professor, [3]Associate Professor, [4]Professor & Head,

[5]Retd. Principal & Dean, N. M. College of Agriculture, NAU, Navsari, Gujarat

Email: rmnaik@nau.in

ABSTRACT

Professionalism is meticulous adherence to undeviating courtesy, honesty, and responsibility in one's dealings with customers and associates, plus a level of excellence that goes over and above the commercial considerations and legal requirements which is needed as a key for business success. The study was conducted for three years in 2017-19. The South Gujarat which has seven districts and all were included for investigation. Every year two districts were taken and from each district 100 respondents were selected. Thus,

the total respondents were 700. Majority of the respondents had middle age category and medium level of income, family size, social participation, faith in people, group motivation and moderate level of perceived benefits of co-operative societies and knowledge about principles of co-operation.

IEA17

Role of the stakeholders in agricultural innovation system

P. H. Vihariya[1], R. D. Pandya[2] and Y. H. Rathwa[3]

[1]Research Associate, Extension Education Institute, AAU Campus, Anand-388110

[2]Rtd. Principal & Dean NMCA, Navsari Agricultural University, NAU, Navsari.

[3]Senior Research Fellow, Extension Education Institute, AAU Campus, Anand-388110

Email: payal14.vihariya@gmail.com

ABSTRACT

Role is a set of connected behaviours, rights, obligations, beliefs and norms as conceptualized by an individual in a social situation. Role is the task performed by an individual is expected to play in AIS. It is a set of socially expected and approved behaviour patterns consisting of both duties and privileges, associated with a particular position in AIS. This infers that the AIS generate a lot of hope for innovative technologies and interactive learning among stakeholders to overcome the weak linkages among them. The present study was carried out in seven districts of south Gujarat during 2020. The six types of stakeholder were playing pivotal role in AIS hence the list of each type of stakeholders were obtained from the concerned authorities. A simple random sampling method was adopted to obtain respondents. Thus, 30 researches, 50 extensionists, 30 in –charge of NGOs, 30 managers of private agencies, 50 owner of agro-service providers and 50 progressive farmers were selected. All the 240 stakeholders were randomly selected. The statistical tools and method was used to analyse the data were frequency, percentage and arbitrary method. It can be concluded that more than two fifth (46.67 and 45.83%) each of the stakeholders performed their good and excellent role in AIS, followed by 7.50 per cent of them execute their poor role in AIS. Thus, it can be said that overwhelming majority (92.50%) of the respondents as stakeholders executed their good to excellent role in AIS.

IEA18

Seasonal fluctuations in cotton prices of international and domestic cotton markets

Upasana D. Bhopala[1] and M. G. Dhandhalya[2]

[1]Ph. D. Scholar and [2]Associate Research Scientist

Dept. of Agril. Econ., CoA, JAU, Junagadh

Email: upasnaahir2312@gmail.com

ABSTRACT

This study has analysed the seasonal variation in cotton prices of national and international cotton markets by calculating seasonal indices using twelve months ratio to moving average method. The results found that the seasonal indices indicated the maximum cotton prices in the months of July-August and the minimum in the months of September to December months. Moreover, the analysis of seasonal variation also indicated the higher inter-year variability in case of cotton prices in all selected markets. The high seasonal variations in cotton prices in major producing markets, except Gondal market (*i.e.* providing better service and price to the farmers compared to others), reveal that farmers have very poor infrastructural facilities for storage, which needs to be enhanced by the government on large scale basis providing subsidy for construction of storage godowns.

IEA 19

Strategies adopted by farmers for doubling farm income in Navsari district

R. B. Rathod[1], P. B.Khodifad[2] and A. S. Patel[3]

[1]Senior Research Fellow, Extension Education Institution, AAU, Anand – 388110

[2]Assistant professor, Department of Extension Education, NMCA, NAU, Navsari

[3] Ph.D. Scholar, Department of Extension Education, CPCA, SDAU

Email: rrb4289@yahoo.com

ABSTRACT

Agriculture has been and will continue to be the life line of an Indian economy. Economic growth of the country largely dependent on agriculture. After independence, India experienced an impressive growth and productivity gains in agriculture. Despite production and productivity in agricultural increased, economic condition of the farmers not improved in that order. A study was conducted in Navsari district of Gujarat state. Out of these, three talukas have been selected for this study and each of taluka, five villages were selected randomly from each selected village, ten farmers were selected. Thus, total 150 farmers have been selected for the study and were interviewed with a structural pre-tested interview schedule**.** The results of the study revealed that the majority 74.00 per cent of the respondents had medium extent of adoption. While, 14.00 and 12.00 per cent respondents had high and lower extent of adoption strategies for doubling farm income.

IEA 20

Assessing the dual impact of dam-driven irrigation water on crop revenue and farmer receptivity in Vadodara district, Gujarat: A structural equational modelling approach

Mohit Kumar[1], Ganga Devi[2] and Rohit Kumar Sharma[3]

[1]Ph. D. Scholar and [2]Assistant Professor, Department of Agricultural Economics, BACA, AAU

[3]Ph.D. Scholar, International Agribusiness Management Institute, AAU, Anand, Gujarat

Email: dhmohitk@gmail.com

ABSTRACT

Understanding the link between dam-driven irrigation water availability and crop income is vital for poverty reduction and food security. Extensive research has tackled this issue, but prior studies had limitations. They focused solely on the direct impact of irrigation water availability on crop income, overlooking its indirect effects. In this study, a structural equation model analysis was used to examine the direct and indirect consequences of dam-driven irrigation water availability on crop income. The study specifically focused on the Sardar Sarovar dam with command area potential under Vadodara district of middle Gujarat. Primary data were collected from a random sample of 160 farmers in Vadodara, with around 97 relying on Sardar Sarovar dam during the dry season, while the rest depended on rainfall. The results revealed that, beyond its direct effect, irrigation water availability also indirectly influenced crop income through farmers' willingness to adopt modern agricultural inputs. Approximately 42 percent of the total impact of dam-driven irrigation water on crop income was mediated by farmers' openness to using yield-enhancing modern agricultural inputs. These findings underscore the importance of irrigation water availability in enhancing both crop income and farmers' receptivity to modern agricultural practices. This highlights the need for a strategic framework recognizing the crucial role of farmers' openness to modern inputs in harnessing the positive effects of irrigation water availability on crop income.

IEA 21

ARYA project: Empowering women in small-scale agricultural enterprise

V. S. Parmar[1], N. S. Joshi[2] and Minaxi K. Bariya[3]

[1] and [2]Krishi Vigyan Kendra, JAU, Amreli

[3]CoA, JAU, Mota Bhandariya (Amreli)

Email: vparmar801@gmail.com

ABSTRACT

The Indian Council of Agricultural Research (ICAR) launched the ARYA (Attracting and Retaining Youth in Agriculture) programme, which is crucial in empowering rural women who work in small-scale agricultural enterprise. By enhancing rural women's participation in farming, fostering economic independence, challenging traditional gender norms, and promoting overall socio-economic development in rural areas, ARYA indirectly empowers rural women. This is done through skill development, entrepreneurship promotion, financial inclusion, technology adoption, networking, gender sensitization, community development, and market access initiatives. This abstract emphasises how ARYA helps rural women become more empowered, enhancing their quality of life and advancing gender equality in rural communities.

IEA 22

Collective strength: Farmer Producer Organizations (FPOs) and the empowerment of rural communities

D. J. Vekariya[1] and N. J. Ardeshna[2]

[1] P. G. Student, [2] Associate Research Scientist

Dept. of Agril. Economics, COA, JAU, Junagadh-362001

Email: dharavekariya8997@gmail.com

ABSTRACT

Farmer Producer Organizations (FPOs) represent a crucial avenue for enhancing rural livelihoods in India. With a significant portion of the country's population reliant on agriculture, FPOs have emerged as a powerful mechanism to address the multifaceted challenges faced by small and marginal farmers. This paper explores the role of FPOs as catalysts for rural development, focusing on their impact on livelihoods. India's agriculture sector, while a cornerstone of the economy, often falls short in meeting the diverse needs of its rural populace. Challenges such as limited access to resources, high production costs, fragmented land holdings, and inadequate market linkages have hindered the progress of rural communities. FPOs, by bringing farmers together in collective entities, offer a solution to these challenges. Through a review comprehensive analysis, this paper highlights how FPOs empower rural communities. They provide smallholder farmers with access to vital resources, including credit, technology, quality inputs, and knowledge. Additionally, FPOs enable economies of scale, which lead to cost efficiencies and improved bargaining power in the marketplace. FPOs also facilitate value addition, processing, and collective marketing, allowing farmers to access better prices for their produce. This leads to increased income and savings for members. Moreover, FPOs foster a sense of community and cooperation, driving social capital and knowledge exchange among farmers. The paper underscores the pivotal role of government agencies, non-governmental organizations (NGOs), and financial institutions in promoting and supporting FPOs. It discusses successful case studies and the impact of FPO interventions on income levels, employment opportunities, and overall living standards in.

IEA 23

Attitude of farmers regarding Pradhan Mantri Fasal Bima Yojana

Sanjay B. Agale, D. B. Patel, Aniket R. Deshpande and Arnab Biswas
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University, Sardarkrushinagar

ABSTRACT

The present study was conducted to study attitude of farmers regarding Pradhan Mantri Fasal Bima Yojana (PMFBY). The study was conducted in North Gujarat. From North Gujarat, three districts and from each selected district three talukas were purposively selected. Five villages from each taluka and from each village eight crop insured farmers were selected randomly. Multistage sampling method was followed for selection of the crop-insured farmers. Thus, total 360 crops insured farmers were selected as sample size. The data was collected through personal interview and it was compiled, tabulated and analyzed to get proper answer with the help of various appropriate statistical tools. From the result of the study, it can be concluded that 66.11 per cent crop-insured farmers had favorable level of attitude towards PMFBY. Out of thirteen independent variables, 10 variables *viz.*, age (0.336), education (0.513), farming experience (0.141), land holding (0.509), annual income (0.511), economic motivation (0.660), decision-making ability (0.679), social participation (0.579), source of information (0.635) and extension participation (0.714) had positive and strong relationship with their attitude towards PMFBY.

IEA 24

Expert system: A tool for technology transfer

D. A. Padaliya[1], N. B. Jadav[2] and H. C. Chhodavadia[3]
[1]Ph. D. Scholar, Dept. of Agril. Extension Education, CoA, JAU, Junagadh - 362001
[2] Director and [3]Associate Director of Extension Education, JAU, Junagadh -362001
Email: darshanapadaliya4257@gmail.com

ABSTRACT

Agriculture is backbone of Indian economy and it is primary sector of country. Growers (Farmers) Require advance or experts' knowledge to take decision during soil preparation, seed selection, fertilizer management, pesticide management, water scheduling, weed management etc, so that to get high yield. Expert system is now being using into agriculture sector. Expert system is most powerful approach that simulates human knowledge from an expert in certain domain for assist human to make decision at a level of or greater than human expert. Expert system helps to Growers in making economically viable and environmentally strong decision related to crop management. After considering success of expert system various expert systems were developed in agriculture. This paper explains need of expert system in agriculture and review of various expert systems in agriculture and assess the effect of using expert system on the performance and decision-making skill of the extension personnel. It is feasible to use an expert system as a decision support tool for transfer of agricultural technologies to the farming community.

IEA 25

Determination of extension interventions to empower resource poor dairy farm households

Saurabh Pandey[1], S. R. Patel[2] and Hemlata Saini[3]
[1]Ph.D. Scholar, [2] Principal, [3]Assistant Professor, AAU, Anand
Email: saurabhpandey91297@gmail.com

ABSTRACT

Dairy farming is practised mainly by resource poor farmers whose limited access to knowledge, skill,

training and credit hamper their socio-economic and technological empowerment. Extension interventions would help these farmers to enhance them to access knowledge and technologies leading to better standard of living. Therefore, the present study was undertaken in three districts of Haryana state namely Karnal, Jind and Jhajjar representing three different Agro climatic zones in Haryana during 2021-2022 to understand their existing level of knowledge, adoption and needs in dairy farming. The study constituted a sample size of 120 respondents by selecting 40 respondents in a cluster of villages with the predominance of resource poor dairy households in each of selected districts. The findings revealed that most of the respondents were middle aged (44.17%), male (81.67%), acquired secondary level of education (26.67%), land holding up to 1 acre (35.83%), belonged to medium level of income group and had joint family (58.33%). Extension interventions were prioritised as per the expert opinion by using Analytical Hierarchy Process methodology which indicated that training has acquired the highest rank with a value of 0.35 followed by demonstration with value 0.34. Among policy interventions, subsidy has acquired the highest rank with a value of 0.37 and then incentive acquired 2nd rank with value 0.25. The study suggests the importance of intensive training, demonstration and exposure visit to research institution and progressive farmers for gradually empowering the resources poor farmers.

IEA26

Knowledge of farmers regarding Pradhan Mantri Fasal Bima Yojana

Sanjay B Agale, D. B. Patel, Aniket R Deshpande and Arnab Biswas
Department of Agricultural Extension and Communication
C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar

ABSTRACT

The present investigation was conducted to known knowledge level of farmers regarding Pradhan Mantri Fasal Bima Yojana (PMFBY). The study was conducted in North Gujarat. From North Gujarat, three districts and from each selected district three talukas were purposively selected. Five villages from each taluka and from each village eight crop insured farmers were selected randomly. Multistage sampling method was followed for selection of the crop-insured farmers. Thus, total 360 crops insured farmers were selected as sample size. The data was collected through personal interview and it was compiled, tabulated and analyzed to get proper answer with the help of various appropriate statistical tools. From the result of the study, it can be concluded that 58.89 per cent of crop-insured farmers had high to very high level of knowledge regarding PMFBY. Age, education, land holding, annual income, economic motivation, decision making ability, social participation, source of information and extension participation were highly significantly related with level of knowledge level of farmers towards PMFBY.

IEA27

Marketing of sapota in Mehsana district of North Gujarat

Patel, R. R., Patel, R. M. and Parul, M. Patel
Department of Agricultural Economics
C. P. College of Agriculture, S.D. Agricultural University, Sardarkrushinagar, Gujarat
E-mail: patelparul583@gmail.com

ABSTRACT

The present study was carried out with a view to estimate the marketing costs, margins, price spread and marketing efficiency for sapota grown in Mehsana district of north Gujarat. The data were collected by survey method for the year 2020-21. Appropriate statistical tools were applied for analyzing the data. The conclusions drawn from the study are that the average yield of sapota per farmer and per hectare of land was estimated to be 38.67 quintals and 138.56 quintals, respectively. Moreover, it has been revealed that the marketable surplus of sapota is 86.45 per cent. The highest disposal of sapota produce was in the month of June (36.18 %) and lowest was in the month of November (0.24 %). About 81.01 per cent quantity of sapota

produce was sold through channel I and only 18.57 and 0.42 per cent of produce were sold through channel-II and channel-III respectively in Mehsana district. The overall per quintal cost of marketing of sapota produce was estimated to be Rs. 160.99 by the growers of Mehsana district in north Gujarat. The net price received by the growers was Rs. 1106.75 qtl^{-1}, which accounted 53.70 per cent producers share in consumer's rupee. The average expenses incurred in the marketing of sapota by the producers, wholesalers and retailers were 7.81, 4.92 and 9.55 per cent respectively. The total price spread was 46.30 per cent of consumer's price when produce was sold through wholesalers and retailers. The marketing efficiency estimated for sapota was 1.16 for Mehsana market in North Gujarat.

IEA 28

Price analysis of a time series data for cauliflower in Gujarat: A requirement for the sustainable rural livelihood

R. T. Khatri, Gaurav Sharma and Narendra Singh
Department of Agricultural Economics
N M College of Agriculture, Navsari Agriculture University, Navsari, Gujarat
Email: gaurav30688@gmail.com

ABSTRACT

The agricultural production of India has increased many folds from independence. However, the fate of the growers mainly relies on the prevailing price of different commodities. Thus, the need of the hour is to readily provide the information of the price to the farmers for improving overall socio-economic livelihood of the growers. In this background present study was undertaken in Gujarat specifically for Cauliflower. Time series analysis was incorporated trend, seasonality, the relationship between price and arrival, market integration and price forecasting of major markets in Gujarat was used for major Cauliflower markets of Gujarat for period from 2008 to 2022. The study reflected that the trend in arrival and prices of Cauliflower was found to be positive in all selected market of Gujarat over the year. The highest seasonal indices of arrivals and prices for cauliflower were generally found in November and January month, respectively in all selected markets. There was a strong correlation between the Vadodara and Ahmedabad markets and there was moderate to high price integration was trend in all of the selected markets. ARIMA and ARCH models were applied for modeling and forecasting cauliflower prices. The study advocates that the ARIMA model being stochastics in nature could be used successfully for modeling as well as for forecasting of monthly pricing of cauliflower in Gujarat.

IEA 29

Socio-economic status of dairy farmers of North Gujarat

M. B. Rajput[1], B. K. Ashwar[2], S. J. Vekariya[3] and N. B. Bhati[4]
[1]Veterinary Officer, and [3]Assistant Professor, DEE, KU, Gandhinagar
[2]Professor & Head, Dept. of Extension Education, CoVS, KU, Sardarkrushinagar
[4]Assistant Professor, Polytechnic in Animal Husbandry, KU, Himmatnagar
Email: mahi10290@gmail.com

ABSTRACT

Socio-economic status of farmer is the position of an individual on the socio economic scale, which is determined by a combination of social and economic factors such as education, income, occupation, herd size and milk production. The present study was conducted in Banaskantha, Sabarkantha and Gandhinagar district of North Gujarat. The data was collected from 180 dairy farmers from 18 villages of selected districts by personal interviewing. The result revealed that majority of dairy farmers were (78.89 %) in middle age group, (79.99 %) educated up to high school to graduate level, (81.67 %) were engaged in dairy farming along with agriculture, (70.00 %) had medium level of experience in dairy farming, medium level of knowledge and

adoption about recommended animal husbandry practices. They had medium level of extension participation and mass media exposure and majority of them had received one training in a year regarding on scientific dairy farming. With regards to socio-economic characteristics the majority of dairy farmers (41.67 %) were in medium to big farmer category, (57.22 %) had small sized herd and economic motivation.

IEA30

Comparison of under nutritional classification methods among *Anganwadi* children of Dantiwada taluka

M K Chaudhari[1] and Preeti H. Dave[2]

[1]Assistant Professor, College of Basic Science & Humanities

[2]Assistant Professor, ASPEE College of Nutrition and Community Science, S.D.A.U., Sardarkrushinagar

ABSTRACT

A number of classifications are available for assessing different degrees of undernutrition. Although weight-for age classification (Gomez, Indian Academy of Pediatrics [IAP]) is most commonly used, height-for-age and weight-for-height classifications (McLaren, Waterlow's) have also been used. However, none of these classifications addresses all the three indices of undernutrition, namely stunting, wasting and underweight. Hence in the present study undernutritional status of anganwadi children by different classifications was assessed and it was compared with different classifications. The study was conducted in Dantiwada taluka of Banaskantha, Gujarat. A multi-stage random sampling method was utilized, 30 anganwadi centers were selected randomly. From each anganwadi centre, ten children were selected to reach the desired sample size of 300 children. The anthropometric measurements of anganwadi children were measured as per the WHO guidelines on anthropometry. Results of the study showed that overall undernutrition is diagnosed more by WHO classification (total 95%) than IAP classification (total 80%). IAP classification diagnosed more children in grade I & II (Moderate under nutrition) and WHO classification detected more number of severe under nutrition. The IAP system identified 15.66 per cent more children as undernourished, whereas the *z* score system identified significantly (3.82 times) more children as severely undernourished. Thirty one of 42 children were graded as severely undernourished (by the *z* score system) and they seem to fall under grade II (moderately undernourished) by the IAP system. This indicates that WHO classification is more sensitive in detecting under nutrition but it has a drawback of classifying more children in severe undernutrition.

IEA31

Relation between characteristics and profitability of dairy farmers in North Gujarat

M. B. Rajput[1], B. K. Ashwar[2], S. J. Vekariya[3] and D. V. Parmar[4]

[1]Veterinary Officer and [3]Assistant Professor, DEE, KU, Gandhinagar

[2]Professor & Head, Dept. of Extension Education, CoVS, KU, Sardarkrushinagar

[4]Assistant Professor, Polytechnic in Animal Husbandry, KU, Sardarkrushinagar

Email: mahi10290@gmail.com

ABSTRACT

The profit derived from a dairy farm operation is the ultimate concern of the farmer in his role as entrepreneur. Many factors influence the patterns of livestock farming and its profitability. The present study was conducted in Banaskantha, Sabarkantha and Gandhinagar district of North Gujarat. The data was collected from 180 dairy farmers from 18 villages of selected districts by personal interviewing. The research was carried out with objective to analyses of profitability of dairy farmers and assess its relationship with selected socio-personal attributes of dairy farmers. Profitability analysis observed that the expenditure on total feed and fodder was highest among all components of gross cost. Milk contributed 96.29 per cent and dung contributed 03.71 per cent to the total return. The Net cost of milk production per liter was found as Rs. 25.40 and net return per liter was found as Rs. 10.26. The Cost benefit ratio was 1:1.62. Correlation

coefficient analysis revealed that herd size, milk production and economic motivation were positive and highly significant, while knowledge, adoption, training received, mass media exposure, extension participation and land holding had positive but non-significant effect on profitability of dairy farmers.

IEA 32

Perception of farmers towards marketing of potato in Banaskantha district of Gujarat

Vinod Gajjar[1], K. P. Thakar[2] and Rahul Joshi[3]

[1]M.Sc. Scholar, College of Agribusiness Management, S.D.A.U., Gujarat

[2]Professor and Head and [3]P.G. Student, Dept. of Agricultural Economics, CPCA, SDAU

Email: rahuljoshi141@gmail.com

ABSTRACT

Potato (*solanum tuberosum, L.*) has emerged as fourth most important food crop in India and world level. Also, potato produces and consume largely worldwide because of its rich nutrients and high dry matters. Banaskantha district of North Gujarat region selected purposefully for study because Banaskantha district has maximum area under potato cultivation. Total 2 talukas Deesa and Lakhani, 20 villages and total 120 farmers were selected by using multistage random sampling design from Banaskantha district. The primary data were collected through personal interviews. The secondary data were compiled from published reports of various government departments, research papers published many authentic websites. Majority of potato growers bought potato seeds from traders or used previous year grown potatoes as seed. For marketing of potato, majority of potato growers took self decision. Out of total production 70-75% potatoes were stocked in cold storage after harvesting. From the total production of potato 81-86 percent potatoes were vegetable potato and 14-19 percent potato were processing potatoes. Out of total production 2-3 percent potatoes were exported and rest of consumed domestically. Dominant three marketing channels were identified; 1) Farm to APMCs/Wholesalers, 2) Farm to Cold Storage 3) Stock in heap method at farm. Considerable no. of potato growers change their marketing perception due to some price oriented reasons in past years. Also concluded that very negligible no. of potato growers buy and sell digitally.

IEA 33

Marketing behaviour of *Kesar* mango among the mango growers

Dharmesh S. Dharasanda[1], Mahaveer Choudhary[2] and K. L. Chaudhary[3]

[1]P. G. Student, [2] and [3]Assistant Professor

Dept. of Agril. Ext. & Comm., NAU, NAvsari

Email: dharsandadharmesh514@gmail.com

ABSTRACT

India is the second largest producer of fruits in the world and holds first position in production of mangoes. As per the second advance estimate of National Horticulture Board, mango is growing on 2291 thousand hectares area and produce 20444 thousand MT in India. The share of mango in total fruit production of Gujarat is 15.90 per cent and contributing 06.70 per cent share in the total production of Indian mango. The study was conducted in Navsari district and the 3 talukas were covered under the study. Two villages were selected from each selected taluka, thus selecting of six villages by simple random sampling technique. From each village 20 respondents were selected through randomly. Thus, total sample of 120 mango growers were drawn for study. The study concluded that majority of the Kesar mango growers under the study were found middle age, high school in education, medium farming experience, semi medium land holding, small area under kesar mango, medium level of annual income and medium farming experience. It was also found that majority of the Kesar mango growers had medium level of source of information, economic orientation,

innovativeness, risk orientation, and scientific orientation. Further, majority of the Kesar mango growers were found to have medium level of marketing behaviour.

IEA34

Relationship between profile and attitude of farm women towards value addition in vegetable crops

P. P. Jadav[1], B. M. Christian[2] and Minaxi Baria[3]

[1]Ph.D. Scholar, Dept. of Agricultural Extension and Communication, AAU, Anand-388110

[2]Assistant Professor and Head, AAU, Vaso-387380,

[3]Associate professor, JAU, Mota Bhandaria- 365610

Email: jadavpalak104@gmail.com

ABSTRACT

In Indian society, farm women have multi-dimensional role ranging from agricultural and allied activities to domestic activities. India is the second-largest producer of vegetables in the world next only to China and accounts for about 15 per cent of the world production of vegetables. At present, less than 2 per cent of fruits and vegetables are processed, even as our county ranks second in the world in terms of production. The preparation of value-added products is mostly confined to household/village or within the easy access of farm women. Because most of the raw materials are available in the village, it is ideal to start as a rural or village enterprise. As a result of this value addition, rural residents would have a lot of job opportunities. The under employed force in rural areas can be profitably utilized. In this context there is a greater scope to go for value added products or processed food products or ready to eat products which can take care of effective utilization of time by the women folk. A questionnaire- based simple random sampling survey was conducted on 120 farm women of Kheda districts of Gujarat state. The statistical measures, such as SPSS and Microsoft excel were used. Nearly three- fifth (59.17 %) of the farm women had moderately favourable attitude towards value addition in vegetable crops. Variables like education (0.499**), scientific orientation (0.446**), economic motivation (0.283**) and risk orientation (0.450**) of the farm women had positive and highly significant correlation with their attitude towards value addition in vegetable crops.

IEA35

Attitude of farm women towards value addition in vegetable crops

P. P. Jadav[1] and B. M. Christian[2]

[1]Ph. D. Scholar, Dept. of Agricultural Extension and Communication, AAU, Anand-388110

[2]Assistant Professor and Head, AAU, Vaso-387380

Email: jadavpalak104@gmail.com

ABSTRACT

In Indian society, farm women have multi-dimensional role ranging from agricultural and allied activities to domestic activities. The preparation of value-added products is mostly confined to household/village or within the easy access of farm women. Because the majority of the raw materials are available in the village, it is ideal to start as a rural or village enterprise. As a result of this value addition, rural residents would have a lot of job opportunities. A questionnaire- based simple random sampling survey was conducted on 120 farm women of Kheda districts of Gujarat state. The statistical measures, such as SPSS and Microsoft excel were used. Nearly three fifth (59.17%) of the farm women had moderately favourable attitude towards value addition in vegetable crops.

IEA 36

An economic impact of PM KISAN scheme on farmer's livelihood: A comprehensive review

Parul, M. Patel, Thakar, K. P., Jadeja, R. M. and Patel, R. R.
Department of Agricultural Economics, C. P. College of Agriculture
S. D. Agricultural University, Sardarkrushinagar, Gujarat
Email: patelparul583@gmail.com

ABSTRACT

The "PM KISAN Scheme" introduced as Direct Benefit Transfer (DBT) scheme by the central government of India has had a positive impact on farmers' livelihoods. This government initiative, aimed at providing direct income support to small and marginal farmers at initial stage, but later it expanded to all the farming community of country with certain exclusion criteria. By transferring financial assistance of Rs. 6000 per year directly to the beneficiaries' bank accounts, the scheme provides financial strength and improve their risk-taking capacity. This in turn, helps reduce liquidity constraints and easing the access to credit. It also enhances their purchasing power, and enabling them to invest in agricultural inputs, machinery, and other farm resources. Further it is evidenced based on the studies that funds received during peak agricultural seasons are predominantly utilized for agriculture- purposes, whereas those received during off-seasons tend to be used for non-productive purposes. Furthermore, cost-return studies reveal that the scheme has contributed to increased agricultural productivity, resulting in higher incomes for PM-KISAN beneficiaries compared to non-beneficiary farmers, although the absolute difference may not be substantial, implying that there is potential for more productive fund utilization. Overall, the government's PM-KISAN scheme is an important step toward improving the livelihoods of landholding families involved in farming and allied activities. It serves as a key income supplement for farmers, ultimately boosting rural economies and fostering sustainable agricultural growth.

IEA 37

Variations and seasonal changes in Soybean prices within domestic and global markets

Jadeja, R. M., Thakar, K. P. and Chaudhary D. D.
Department of Agricultural Economics, C. P. College of Agriculture
S. D. Agricultural University, Sardarkrushinagar, Gujarat
Email:rmjadeja@sdau.edu.in

ABSTRACT

Soybean, being one of the most widely cultivated crops globally, plays a significant role in global agriculture and food production. However, soybean prices have experienced significant fluctuations over the past few years, causing imbalances in resource allocation and generating demand and supply gaps. Thus, analyzing past price trends is crucial to understand the current scenario and formulate appropriate strategies to improve the marketing system. This study examines the trends and seasonal variations in soybean prices in local, national, and international markets using compound growth rate, trend and seasonality analysis. Monthly and yearly time series data of soybean prices in selected markets were collected from July 2006 to June 2021. The finding revealed a continuous rise in soybean prices in India over the 15 years. The results revealed that the rise in soybean price during this period was due to inflation, and farmers were not benefited. Furthermore, the study identified seasonal variation in soybean prices, with peak prices observed during May in most markets, when the crop comes to harvest. The study findings can be useful for policymakers and farmers to understand the trends and seasonal patterns in soybean prices.

IEA 38

Construction of scale for measuring agricultural modernization of tribal farmers

A. C. Jatapara, K. A. Thakkar and A. R. Deshpande
Sardarkrushinag Dantiwada Agricultural University, Sardarkrushinagar
Email: alpeshjatapara@gmail.com

ABSTRACT

For constructing the agricultural modernization scale, the various indicators followed: innovativeness, cosmopoliteness, extent of utilization of mass media, cropping pattern, seed selection, adoption of micro irrigation system, marketing of agricultural production and dairy produce, available modern machinery and implements, adoption of Integrated Nutrient Management, use of organic fertilizers, storage facility, extent of adoption of plant protection measures and adoption of improved dairy practices. A scale to measure the agricultural modernization of the tribal farmers was developed by using normalised rank approach method. Total seventeen possible indicators of agricultural modernization were selected for the scale and circulated to a group of 102 judges from State Agricultural Universities (SAUs) and various related institutions. Out of 102 judges 73 responded. Their opinion was utilised for item analysis. Out of the seventeen indicators, thirteen indicators were selected as they were found relevant by 75 or more per cent of the judges. While four indicators were delete. In order to determine the scale value of each items ranked by judges, the centile position "P" value was worked out. Those indicators which received one or more than one positive "P" value were considered. All thirteen relevant indicators were finally selected for the scale. Validity of the scale was confirmed by content validity. Split halves technique of reliability was used to determine the reliability of the scale.

IEA 39

Knowledge of rural women regarding fruit processing and preservation in Amreli district

Minaxi K. Bariya[2], V. S. Parmar[1] and J. V. Chovatia[3]
[1]College of Agriculture, JAU, Mota Bhandariya
[2]Krishi Vigyan Kendra, JAU, Amreli
[3]CoA, JAU, Junagadh
Email: minaxibariya@gmail.com

ABSTRACT

The state of Gujarat has a variety of soils, rainfall pattern, temperature regimes, and irrigation facilities. This diverse agro-climatic situation across the state holds potential for development of the horticulture sector in a big way. Focusing on the importance of fruits and vegetable processing and preservation, a study was conducted by the researcher to check the knowledge of rural women regarding fruit processing and preservation. Ex-post facto research design was applied for this study. Five talukas in Amreli district were purposively selected for the study based on the highest horticultural crop production. Again from each talukas two villages were selected purposively based on the highest horticultural crop production. From each village fifteen rural women were selected randomly. Thus making total sample size was 300. Study revealed that majority of the respondents (67.00 %) had medium level of knowledge about fruit processing and preservation, while 17.33 per cent of respondents had low and 15.67 per cent of respondents had high level of knowledge about fruit processing and preservation, respectively.

Role of ICT in Transfer of Technology (ICT)

ICT 1

Empowering agricultural outreach: The role of ICT tools in extension research and technology dissemination

Pankaj Kumar Ojha[1] and Soumya C.[2]

[1]Assistant Professor, Banda University of Agriculture and Technology, Banda (U.P.)

[2]Assistant Professor, CPCA, SDAU, Sardarkrushinagar (Gujarat)

Email: pankajojhabhu@gmail.com

ABSTRACT

The integration of Information and Communication Technology (ICT) tools has brought a profound shift to agricultural outreach, redefining extension research and technology dissemination. The paper, "Empowering Agricultural Outreach: The Role of ICT Tools in Extension Research and Technology Dissemination," highlights the pivotal contribution of ICT tools in reshaping agricultural practices. ICT tools have revolutionized extension research by facilitating efficient data collection, analysis, and real-time monitoring. This improves the quality of research and accelerates decision-making for farmers and extension practitioners. Furthermore, technology dissemination has been greatly enhanced through platforms like mobile apps, online portals, and social media. These tools empower extension workers to deliver tailored information, transcending geographical boundaries and creating informed agricultural communities. The paper examines global instances where ICT tools have driven agricultural advancement, addressing challenges such as digital literacy and accessibility. By embracing these tools, equitable access to information can be ensured, fostering sustainable practices and bolstering food security. In conclusion, the paper underscores the transformative role of ICT tools in extension research and technology dissemination, reshaping agriculture into a technologically empowered realm.

ICT 2

Use of mobile phone by farmers in their agricultural advancement

A. B. Dhola, R. R. Prajapati and V. G. Tala

Department of Agril. Extension and Communication

S. D. Agricultural University, Sardarkrushinagar

Email: adarshdhola@gmail.com

ABSTRACT

The key area of agriculture that focuses on the empowerment of agricultural and rural development in India is telecommunications. The term “ICT” refers to a variety of electronic and print media including mobile phones, internet, telephone, computer, radio and television. Use referred as the action of using something or the state of being used for a purpose. Use of mobile phone by farmers in agriculture was measured by structured schedule with number of statements. Farmers now have a new perspective and method of decision-making because of mobile phones. So, in light of the significance of mobile phones, a study was carried out to know the use of mobile phone by farmers in their agricultural advancement. The study was conducted in three districts (Surat, Navsari and Valsad) of South Gujarat. A simple technique was used to get 2 talukas each from all three districts. Out of 6 talukas, 25 respondents from each were selected randomly. Thus, 150 respondents were obtained for the present study. Result revealed that more than two-fifths (44.66%) of the respondents were regularly use their mobile phone, followed by 30.66 and 24.66 per cent of them occasionally and never use their mobile, respectively.

ICT 3

Information obtained by farmers through mobile phone

A. B. Dhola, R. R. Prajapati and H. C. Chaudhary
Department of Agril. Extension and Communication
S. D. Agricultural University, Sardarkrushinagar
Email: adarshdhola@gmail.com

ABSTRACT

Information and Communication Technology in agriculture is an emerging field which focuses on the empowerment of agricultural and rural development in India. It involves the applications for rural domain. Mobile phone has been widely accepted mode of delivering information. Telecommunication in agriculture is major field in agriculture which focus on the empowerment of agricultural and rural development in India. Which consider the use of Information and Communication Technologies (ICT) in the rural domain. ICT is an umbrella term involving electronic and print media such as mobile phones, internet, telephone, computer, radio and television. Information is acknowledged from investigation. It is also being said as knowledge communicated or received concerning a particular circumstance, facts about a situation, person or an event. Farmer access information through their mobile phone. Mobile phone has given new way of thinking and approach to farmers for making their own decision. So, considering the importance of mobile phone, a study was conducted to know the information obtained by farmers through mobile phone. The study was conducted in three districts (Surat, Navsari and Valsad) of South Gujarat. A random sampling technique was used to get 2 talukas each from all three districts. Out of 6 talukas, 25 respondents from each were selected randomly. Thus, 150 respondents were obtained for the present study. Result revealed that majority (79.33%) of the respondents were obtained different type of information on occasionally to regular base.

ICT 4

Innovative ICT approaches for sustainable agriculture and rural resilience

Umang B Patel[1], Kalpesh L Chaudhary[2], Shivangi B Patel[3], Arvind P Chaudhary[4]
[1]and [3]Ph.D Scholar, [2]Assistant Professor, NMCA, NAU, Navsari
[4]Assistant Professor, Dept of Social Science, ACH, NAU, Navsari
Email: patelumang4372@gmail.com

ABSTRACT

In today's knowledge-driven world, the exchange of information has become crucial and this exchange heavily relies on the rapid flow of data. Information and Communication Technologies (ICTs) play a vital role in facilitating communication, learning and daily life. Recently, the term has been used to describe the merging of multiple technologies and the utilization of shared transmission lines to carry a wide array of data and communication in various forms. This form of technology-supported education and learning employs computer technology as the medium of instruction, with a focus on digital technologies. The rapid expansion of digital infrastructure over the past decade, coupled with government initiatives, has made internet access easily available even in remote areas. Initiatives like Kisan Call Centers, community radio services, e-choupal and mobile phones are utilized for seeking information related to extension services and rural development. To address this, it's crucial to enhance the educational status of farmers and provide accurate and relevant information consistently to ensure the effective use of ICT services. This will ensure timely and proficient advice reaches the farmers. ICTs can contribute not only to the advancement of agriculture but also to the growth of agricultural research, extension, and education systems. There is growing evidence of ICT's positive impact on agricultural development and poverty reduction.

ICT 5

Influence of digital advertising on farmer choice in agricultural products

Foram Joshi[1], Serene Shekhar[2] and Tejasveeta Bavishi[3]

[1]M.Sc. student, [2]Assistant Professor, [3]Ph. D. scholar, Department of Extension Education and Communication Management, ASPEE College of Nutrition and Community Science, SDAU

Email: joshiforam7007@gmail.com

ABSTRACT

The agricultural landscape is undergoing a profound transformation driven by digital influences, significantly shaping farmers' decision-making processes regarding various agricultural products. This study explores the multifaceted impact of advertisements and digital platforms on farmers' choices, with a focus on pesticides, fertilizers, weed control, and hybrid seed selection. In the digital era, farmers have unprecedented access to information, enabling them to make more informed decisions. They can compare product features, prices, and reviews online, facilitating cost-effective and sustainable choices. However, this digital landscape also presents challenges, including information overload and the potential for misinformation. To optimize the benefits of digital resources, farmers must critically evaluate the credibility of sources. This research highlights the complex interplay between digital influences and agricultural decision-making, emphasizing the need for informed, responsible choices to meet the evolving demands of modern farming practices.

ICT 6

Utilization and credibility of mass media and print media by farmers in Bundelkhand region of Uttar Pradesh

Shubham Singh, Purushottam Sharma and Arvind K. Bharti

Email: shubhamsinghsvpuat@gmail.com

ABSTRACT

Mass media and print media hold immense importance for farmers by serving as indispensable sources of information, education, and support. These media platforms play a pivotal role in disseminating critical agricultural information, including weather forecasts, market prices, government policies, and best farming practices. They offer crop advisory services, connecting farmers with expert guidance on cultivation techniques, pest management, and more. Furthermore, media outlets facilitate market access, empower farmers with knowledge about government subsidies, and promote community building among agricultural communities. In times of emergencies, they swiftly convey vital alerts. Overall, mass media and print media are instrumental in enhancing the livelihoods of farmers by equipping them with the information and resources necessary for informed decision-making and sustainable agricultural practices. The study was conducted in Bundelkhand region of Uttar Pradesh and Jhansi and Banda districts were selected for the investigation. It was observed that television is considered to be the most credible and utilized mass media by farmers followed by mobile messages/calls and newspaper to be most credible and utilized print media by farmers and it was also observed that there is a positive correlation between age, education, land, annual income, possession of farm implements and domestic resources had a positive and significant correlation with utilization of mass and print media. It can be said that mass media and print media are vital pillars of support for farmers, equipping them with the information and resources necessary for informed decision-making, sustainable agricultural practices, and improved overall livelihoods. Their role in bridging the information gap and empowering farmers is indispensable in fostering agricultural growth and resilience in rural communities.

ICT 7

Using of mass media exposure for girl's hosteller students in SDAU

Tejasveeta Bavishi[1], Serene Shekhar[2] and Sima Kachhot[3]
[1] and [3]Ph.D. Scholar, [2]Assistant Professor
ASPEE College of Nutrition and Community Science, SDAU
Email: tejubavishi26@gmail.com

ABSTRACT

Mass media exposure on social networking sites are a recent trend in this revolution. In the last ten years, the online world has changed dramatically. Thanks to the invention of social media, young men and women now exchange ideas, feelings, information, pictures and videos at a truly astonishing rate. The topic of this paper is a try to find out how mass media exposure sites are used by students and their reactions to them. This study investigates user behavior to see if it's possible for people to become addicted to social networking. The representative pilot study was research among girls students who were Sardarkrishinagar Dantiwada Agricultural University hostellers collected and studied for the objective. The total sample of the study was 60 girls students. Purposive random sampling was used for sample selection. It was discovered that the majority of students selected Facebook, Whatsapp, Instagram, Snapchat and had others accounts there. Social media promotes deceptive posts, messaging, photographs that give rise to conflicts in between them. Such posts spoil the brain and physical development of students. As youngsters are immature, they are becoming victims of cyberbullying. This impacts young people mental and physical health and may also leads to depression and self-harm. Overall it was found that social networking sites affected girls' hosteller students positively as well as negatively.

ICT 8

Use of social media and its impact on academic performance of student

Parvadiya Raj M.[1] and Hemlata Saini[2]
[1]P.G. Student and [2]Assistant Professor
Department of Agricultural Extension and Communication, BACA, AAU, Anand
Email: parvadiyaraj@gmail.com

ABSTRACT

In today's interconnected world, social media stands as a ubiquitous platform that shapes communication, information dissemination, and social interactions. As an essential facet of modern life, its influence on various aspects, including academic endeavors, has drawn significant attention. This study investigates the relationship between attitude and perception of students regarding academic performance and their use of social media within an Agricultural University of Gujarat, employing quantitative research methods to discern potential correlations. The research gathers insights through a carefully designed Google Forms questionnaire, focusing on personal, social, and communication attributes. The sample, consisting of 100 respondents selected via simple random sampling, serves as a representative cross-section. Utilizing statistical techniques such as frequency distributions and correlation coefficients, the study elucidates potential relationships between social media usage and communication skills, as well as academic performance. The results unravel intriguing dynamics: a positive correlation between communication skills and social media engagement, and a similar connection between academic performance and social media use. As a result they visit their social media sites and spend between thirty minutes to more than two hours every day. The study revealed that the use of social media had affected academic performance of the respondents negatively and further confirmed that there was a strong positive relationship between the use of social media and academic performance. The study further reveled that most respondents use the social media sites to entertainment than for academic purpose. Therefore it is our suggestion that for students to be more productive, the need to minimize the time they spend engaging on social media activities. As the academic

landscape continues to evolve in tandem with technological advances, this study underscores the need for mindful and strategic social media engagement to ensure a harmonious coexistence between online interactions and academic excellence.

ICT 9

Social media utilization behaviour among farmers

Minal S Rathwa[1], B. M. Christian[2] and Minaxi Bariya[3]

[1]M. Sc. Scholar, AAU, Anand

[2]Assistant Professor and Head, AAU, Vaso, [3]Associate Professor, JAU, Mota Bhandariya

Email: minalrathwa08@gmail.com

ABSTRACT

The rapid advancement of communication technologies has ushered in a transformative era for agricultural communities, reshaping the way farmers interact and exchange information. In this digital age, social media platforms have emerged as powerful tools bridging geographical distances and connecting farmers worldwide. This study explores farmers' social media use, uncovering motives, preferences and engagement patterns. By doing so, it provides insights into how social media transforms agriculture, facilitating knowledge exchange and advancing farming practices. The research study was conducted among random sample 90 farmers of Vadodara and Chhota udepur districts of Gujarat state who using social media. Ex-post-facto research design was used and the data were collected through personal interview technique. This research delves into the intriguing realm of social media utilisation behaviour among farmers, providing valuable insights into their motives, preferences and engagement patterns. The study reveals that social media serves as a dual-purpose platform for farmers, with 100 per cent utilising it for entertainment and 98.90 per cent for general awareness. Notably, WhatsApp (96.66 %) and YouTube (96.70 %) emerge as the preferred social media platforms, with the majority of farmers engaging with them on a daily basis. Interestingly, a significant portion of farmers participate in content creation by uploading videos (24.40 %) and audio (14.44 %), showcasing their active involvement on social media platforms. The focal points of agricultural engagement on social media, as revealed by the study, are news related to agriculture (with a mean score of 2.84) and agricultural schemes (with a mean score of 2.73). This research underscores the transformative power of social media in shaping agricultural practices and fostering knowledge exchange among farmers, facilitating advancements in farming techniques and information dissemination.

ICT 10

Suggestions from Agro-Sandesh readers to overcome the constraints experienced by them to improve agricultural information

H. C. Chaudhari [1], M. A. Tunvar[2] and A. B. Dhola[3]

[1] and [3]Ph. D. Scholar, Department of Agril. Extension and communication, CPCA, SDAU

[2]Training Associate, Directorate of Extension Education, SDAU, Sardarkrushinagar

Email: harshil2772@gmail.com

ABSTRACT

Newspaper could also be effective media in changing perception, attitude and actions of people when they are literates. In Gujarat, Sandesh is leading daily newspaper and it was founded in 1923. A study was conducted to know the reading behaviour of Agro Sandesh daily newspaper by farmers. Ex- post facto research design was used for this study. The study was conducted in three talukas of Banaskantha district and reveal that the most important suggestions expressed by Agro Sandesh readers were; more seasonable information should be provided (83.91%), use of more local and familiar words (77.62%), provide regular Agro Sandesh in rural area (66.43%), simplified information about doses of different fertilizer application as well as other scientific procedure (65.03%), publication of information on government schemes (52.44%),

publication of information on water harvesting (41.95%), publication of information on pest and disease management (38.46%), use of short sentences (27.97%), publication of information on scientific agricultural practices (23.07%), use of bigger size letters (20.27%), short review of plant medicines or herbal treatments should be included (9.09%), use of colour photographs (6.99%), publication of more information in success stories category (3.49%) and illustration with more number of photographs (2.09%).

ICT 11

Attitude of APMC members towards e-agriculture portal of South Gujarat

N. N. Patel, N. M. Chauhan and P. B. Khodifad
Department of Agricultural Extension and Communication
N. M. College of Agriculture, Navsari Agricultural University, Navsari
Email: nikulsinh_m@nau.in

ABSTRACT

The Agricultural Produce Market Committee (APMC) is an autonomous body established in most states by the respective State Governments to safeguard farmers from exploitation by middlemen, to reduce the price spread from farmer to consumer and to trade certain notified farm produce. As per the Model APMC Act enacted by the Central Government, every APMC has a committee of elected members. These members through the officials manage the activities of APMC yard. They also guide the sellers, the farmers and the buyers, the traders by providing information about marketing so that farmers and traders get higher prices. For this, they also need to update their knowledge and information every day. E-Agriculture portals launched by different organizations, state and central government are very helpful to them in accessing the latest agricultural and marketing information. While using the e-Agriculture portals APMC members experienced pros and cons and consequently, they might develop an attitude towards the e-Agriculture portals. Keeping this in view, the present study was conducted in five Navsari, Valsad, Surat, Bharuch and Narmada of the South Gujarat region. To select respondents, three APMCs from each district and ten respondents from each APMCs were selected following simple random sampling. A total of 150 respondents were selected for the study. Ex-post-facto research design was adopted for the study. To measure the attitude level of APMC members towards the e-Agriculture portal, the scale developed by Patel (2007) was used with due modifications. Data were collected by personal interviews of the respondents. The study indicated that the majority of the respondents had a favorable attitude toward the e-Agriculture portal. Correlational analysis revealed that occupation, annual income, professional zeal, scientific orientation, innovativeness education, experience as an APMC member, mass media exposure, training received, social participation, availability of smartphone and internet exposure were found positively and significantly related to the attitude of APMC members towards the e-Agriculture portal.

ICT 12

Accessibility and utility pattern of ICTs apparatus by employees of South Gujarat for exploring agricultural information

R. M. Bhuva[1], S. R. Kumbhani[2], V. S. Parmar[3] and K. L. Chaudhary[4]
[1,2] and [4]Assistant Professor
Department of Agricultural Extension and Communication, NMCA, NAU, Navsari, Gujarat
[3]Scientist, KVK, Amreli, JAU, Junagadh, Gujarat
Email: rmbhuva@nau.in

ABSTRACT

ICTs apparatus and applications offer excellent possibilities for strengthening the linkage between research, extension and client system. Further, the ratio of extension agent to farmer can bridge by ICTs

apparatus. In present study, the well established institutions and private stakeholders of south Gujarat were identified who are exploring the agricultural information. The personnel engaged in welfare activities of those firms were identified. Among them, 200 employees were randomly selected for study. Structured schedules were developed for measuring accessibility and utility Pattern of ICTs apparatus. Utility pattern of employees was measured in terms of extent of utilization, purpose of utilization and duration of utilization of ICTs apparatus. In case of extent of utilization, 12.00 and 39.50 percent of the respondents were used radio and digital camera 10 times in a month, while 59.00, 32.00, 96.00, 65.50, 67.00, 57.00, 62.00 and 73.50 percent of them were using television, telephone, mobile, computer, internet, e-mail, search engine and Social media 10 times in a day respectively. Further, 35.00 percent were using agricultural portals 10 times in a week, and 13.00 percent were using video conferencing 10 times in a month and week. All the respondents were utilizing ICTs apparatus for retrieving knowledge/information and speedy communication followed by 98.50 percent for e-mailing, 95.50 percent for storing information, 83.00 percent for training and entertainment, 79.50 percent for know more about market situation, 77.00 percent for research and extension activity, 75.00 percent for networking with other organization, 74.50 percent for transfer of technology and 74.00 percent for data collection and analysis. In case of duration of utilization, 11.00, 68.50, 12.00 and 38.00 percent of the respondents were using radio, e-mail, video conferencing and digital camera up to 3 hours per week respectively while, 36.00 and 34.50 percent of them were using telephone and agricultural portals for 3.1 to 6 hours per week. Further, 65.50, 80.00, 67.50, 66.50, 69.50 and 72.50 percent were using television, mobile, computer, internet, web based search engine and social media for more than 6 hours per week respectively. Majority (77.00 %) of the respondents possessed moderate to higher level of accessibility of ICTs apparatus.

ICT 13

Media in agriculture: The influence of mass and print media on farming practices

H. M. Patel, U. B. Patel, Narendra Singh

Department of Agricultural Economics, N. M. College of Agriculture, NAU, Navsari

ABSTRACT

The role of mass and print media in agriculture is pivotal in disseminating information, fostering agricultural development and empowering farmers. Mass media including television, radio and online platforms, serve as powerful tools to broadcast agricultural knowledge providing farmers with essential updates on weather forecasts, market trends and farming techniques. Print media, such as newspapers and magazines, complement this by offering in-depth articles, analysis and feature stories that educate and inspire both novice and experienced farmers. These media outlets play a vital role in bridging the information gap, enabling farmers to make informed decisions about crop choices, pest management and sustainable practices. Additionally, mass and print media serve as advocacy platforms, raising awareness about agricultural issues, policies and innovations, thereby influencing public opinion and policy formulation. Overall, the mass and print media's contribution to agriculture is indispensable in enhancing productivity, promoting sustainability, and improving the livelihoods of farming communities.

ICT 14

Relationship between profile of farmers and their knowledge about social media

K. H. Patel, S. P. Pandya and K. V. Chaudhary

Department of Agricultural Extension and Communication

CPCA, SDAU, Saradarkrushinagar

Email: patelkhushbu80731@gmail.com

ABSTRACT

Organizations all over the world are progressively using social media platforms like Twitter, Facebook, WhatApp and YouTube. Both researchers and practitioners in the field of agricultural extension are interested

in social media. e.g., Facebook, Twitter, YouTube and WhasApp are the applications that have been suggested as having potential for extension efforts. A study was undertaken with objective to analyse the relationship between knowledge level of the famers about social media as a source of agriculture information and profile of the farmers. This study was conducted in Sabarkantha district. Multistage random sampling techniques were adopted for selection of talukas, villages and respondents. Total 150 respondents from were selected for the study. The independent variables viz., education, mass media exposure and social media exposure were positively and highly significantly correlated, while achievement motivation and information seeking behaviour had positively and significantly correlated with knowledge level about social media as a source of agricultural information. Age had negatively and highly significantly correlated, while size of land holding, farming experience, annual income and innovativeness were positively and non- significantly correlated with knowledge level about social media as a source of agricultural information.

ICT 15

Role of social media in empowering women farmers in India

Minaxi. K. Bariya[2], V. S. Parmar[1] and R. M. Bhuva[3]

[1]Krishi Vigyan Kendra, JAU, Amreli, [2]CoA, JAU, Mota Bhandariya (Amreli)

[3]N. M.C.A., NAU, Navsari

Email: vparmar801@gmail.com

ABSTRACT

The empowerment of women farmers in India is greatly aided by social media. They gain access to priceless agricultural knowledge, networking and community building are made easier, direct market engagement is made possible, educational initiatives are supported. Social media is also helping to empower women farmers in India by providing them with a platform to connect with each other, share knowledge and resources that can help them improve their livelihoods and promote gender equality in India's agricultural sector. Despite these encouraging benefits, addressing issues with digital literacy, internet accessibility, worries about data privacy, and false information is crucial to ensuring equitable access and maximising social media's potential to improve the lives of women in agriculture. Collaboration with NGOs, authorities, and community-based projects enhances the influence of social media on the empowerment of women farmers in India.

ICT 16

Sustainable farming through IT : A path to food security

H. M. Patel, U. B. Patel and Narendra Singh

Department of Agricultural Economics, N. M. College of Agriculture, NAU, Navsari

ABSTRACT

IT-based initiatives in agriculture are transforming traditional farming practices into efficient, data-driven systems. By incorporating technologies such as sensors, drones and satellite imagery, precision agriculture enables real-time monitoring of soil conditions and crop health. This data-driven approach optimizes resource allocation, reduces waste and enhances overall productivity. Additionally, the integration of IoT devices and smart farming techniques automates tasks, remotely controls irrigation and improves livestock management, resulting in streamlined operations and resource conservation. Big data analytics and machine learning algorithms process vast amounts of information, offering insights for better decision-making, from predicting disease outbreaks to optimizing planting schedules. Mobile apps and online platforms provide farmers with access to market information, financial services and agricultural training, closing information gaps and empowering them with knowledge. These IT initiatives not only boost agricultural productivity but also promote sustainability by encouraging responsible resource management and reducing environmental impact, making them vital tools in addressing the global challenges of food security and climate change.

ICT 17

Relationship between profile of farmers and their perception towards social media

K. H. Patel, S. P. Pandya and K. V. Chaudhary
Department of Agricultural Extension and Communication
CPCA, SDAU, Saradarkrushinagar
Email: patelkhushbu80731@gmail.com

ABSTRACT

Organizations all over the world are progressively using social media platforms like Twitter, Facebook, WhatApp and YouTube. Both researchers and practitioners in the field of agricultural extension are interested in social media. e.g., Facebook, Twitter, YouTube and WhasApp are the applications that have been suggested as having potential for extension efforts. A study was undertaken with objective to find out the relationship between perception of the farmers towards social media as a source of agricultural information and profile of farmers. This study was conducted in Sabarkantha district of Gujarat state. Multistage random sampling techniques were adopted for selection of talukas, villages and respondents. Total 150 respondents were selected for the study. The independent variables *viz*., education, social media exposure and information seeking behaviour were positively and highly significantly correlated while annual income, mass media exposure and innovativeness had positively and significantly correlated with perception towards social media. Age and farming experience had negatively and non-significantly correlated while size of land holding and achievement motivation were positively and non-significantly correlated with perception towards social media.

ICT 18

Utilization of information and communication technology services by farmers

P. B. Raviya[1], V. J. Savaliya[2] and P. S. Sharma[3]
[1]Senior Research Fellow, [2]Training Associate and [3]Assistant Extension Educationist
Directorate of Extension Education, JAU, Junagadh
Email : praviya29@gmail.com

ABSTRACT

Information and Communication Technologies (ICTs) have a significant impact on the agricultural sector. ICT facilitate the flow of information, enhance decision-making and improve overall efficiency in farming practices. This interconnectedness among researchers, extension workers and farmers is helpful for timely and easy transfer of knowledge and skills related to agriculture and allied fields. This leads to more diffusion and adoption of practices and technologies by the farmers and thereby more sustainable and productive agriculture. A study was conducted in Junagadh, Rajkot and Amreli districts of Gujarat state. Two talukas were selected from each district. From each selected taluka, four villages were selected randomly. Total twenty-four villages from six talukas were selected randomly and ten farmers from each village were selected as respondents. Thus, a sample of 240 farmers was considered for the study. The dependent variable undertaken in this study was "Utilization of ICT Services by Farmers". The result showed that ICT services which had higher utilization level were: Mobile (71.76 %), TV (65.16 %), WhatsApp (64.26 %), YouTube (54.00 %), Kisan Call Center (51.10 %), I-Khedut Web Portal (43.78 %), Facebook (32.33 %), agri.gujarat.gove.in (29.79 %), JAU-AAU-SDAU-NAU website (25.50 %), Agri Media App (23.93 %) and Radio (19.91 %).

ICT 19

Influence of mass and print media on community nutrition literacy: A discussion

Jeni Lalwani and Tejasveeta Bavishi
ASPEE College of Nutrition and Community Science, SDAU

ABSTRACT

This paper examines the impact of mass and print media on community nutrition literacy. It delves into the various ways in which these forms of media influence individuals' understanding and knowledge of nutrition-related topics. In the contemporary era, individuals tend to place unwavering trust in the information they encounter through consuming written or visual various sources. The tendency towards unquestioning acceptance can result in major mistakes and have detrimental effects on overall health and well-being. The study explores the potential benefits and drawbacks of mass and print media in promoting community nutrition literacy. Through an analysis of existing literature and research, this paper aims to provide a comprehensive discussion on the subject, shedding light on the role of media in shaping community nutrition literacy.

ICT 20

Effectiveness of mobile SMS agro advisory for agriculture

B. C. Bochalya[1], J. N. Vyas[2] and A. K. Vala[3]
[1]Scientist, [2]Senior Scientist and Head and [3]Agricultural Officer, KVK, JAU,
Nana- Kandhasar (Chotila), Surendranagar
Email: bcb.kvk@gmail.com

ABSTRACT

In modern era mobile phone is a key component of agricultural information for the farmers to improve the production and productivity of the crops. All over India, Agricultural Universities, Krishi Vigyan Kendras, private sector and Non-Government Organizations send agricultural information to farmers through short message services (SMS) and voice calls. Messages covering the information related to agricultural inputs such as seed, fertilizer and cultivation techniques, plant protection, harvesting, weather forecasting and other location specific information are sent to farmers. Surendranagar has huge number of farmers registered to the mobile agro advisory services facilitate the SMS agro advisory services through Krishi Vigyan Kendra. Hence the study of effectiveness of Mobile SMS agro Advisory among the farmers of Surendranagar district under taken. 300 sample farmers were selected for the study. An interview schedule was prepared to collect the required information as per the objectives of the study. The collected data was quantified, categorized and tabulated under the following broad heads. Data analysis was carried out by using appropriate statistical tools. This was from the study cleared that 59.00 per cent of the respondents came in the category highly effective followed by 36.00 % of the respondents in effective and 5.00% of the respondents were found not effective of mobile SMS agro advisory service.

ICT 21

Impact on digitalization in transfer of agricultural technology

V. G. Tala, R. U. Chaudhary and A. B. Dhola
Dept. of Agri. Extension & Communication, CPCA, SDAU, Gujarat
Email: vivektala105@gmail.com

ABSTRACT

Farmers' incomes in India are very low and efforts have to be made to enhance their incomes. For this, increasing the efficiencies of agricultural production processes and the entire value chain is important. The important components of agricultural extension systems are agricultural research, extension and farmers. So

the main role of digitalization is to establish connections among them. Digital technology can deliver useful information to farmers about agriculture like crop care and animal husbandry, fertilizer and feedstock inputs pest control, seed sourcing and market prices. There is a need to develop awareness and interest among the farmers and extension personnel about the use of digital technology. It is useful for farmers to increase crop produce and can save time, can do farm operations easily. Modern day ICTs are bringing vast amount of information to rural communities. Digital agriculture is emerging as one of the ways to increase efficiencies and enhance incomes in agriculture globally. We define digital agriculture in the Indian context and list the challenges as well as the possibilities for digital agriculture in India. We find that lower cost of technology, easy to use portable hardware, pay per use renting models, policy support and harnessing the power of farmer collectives are essential for the success of digital agriculture in India.

ICT 22

Artificial intelligence (AI) imminent in food industries: A review

N. D. Joshi[1], S. H. Akabri[2], D. P. Joshi[3]
[1] Assistant Professor, College of Food technology, SDAU
[2] Associate Professor, College of Food Technology & Bio-energy, AAU
[3] Ph. D Scholar, CPCA, SDAU
Email: niravjoshi56@sdau.edu.in

ABSTRACT

The theory and development of computer systems that can carry out activities that typically require human intellect is known as artificial intelligence (AI). In an effort to increase revenues and find new methods to contact and serve customers, the food sector has started embracing AI technology due to fierce competition and rising demand. The food sector is demanding more intelligent systems due to their increased capacity for diverse activities such food quality assessment, control tools, food categorization, and prediction. In order to choose the best approaches for advancing upcoming AI- and food industry-related innovations, this article evaluates those many applications and contrasts their benefits, drawbacks, and formulations. The food supply chain can be improved overall and significantly increased in efficiency by implementing AI technology at every level. Machine learning and deep learning are two of the technologies that may be used to forecast global demand and offer safe food items. Most widely applied algorithms in artificial intelligence. Many locations do not have completely automated food processing. Artificial intelligence is aiding the food processing business in many ways, including sorting goods, keeping up with health and safety regulations, creating new products, and streamlining the supply chain. In essence, technology facilitates work streamlining. Procedures, simplifying worker tasks and increasing operational effectiveness. The food processing sector may ensure optimal food quality and hygienic conditions by optimising process automation.

ICT 23

Information and communication: Key to disaster management

Hitesh B. Patel, Shailesh K. Mody, Ratn Deep Singh and C. M. Modi
College of Veterinary Science & Animal Husbandry
Kamdhenu University University, Sardarkrushinagar
Email: drhitesh2002@kamdhenuuni.edu.in

ABSTRACT

Effective communication is essential for effective disaster management, starting with the warning phase and continuing through the coordination of relief efforts in the case of an unfavourable incident. Strong communication channels and objectives are essential for efficient disaster management. It is the foundation

of humanitarian and disaster management efforts. Transmitting thoughts, ideas, cautions, instructions, directions, orders, knowledge, and information is the fundamental definition of communication. There are two separate aspects to the communication: the mental and the physical. The physical one has a number of cutting-edge technology instruments that are available in the current scientific era. It covers radio, television, internet, and satellite broadcasting, among other things. When communicating conceptually, it is essential that both senders and recipients have a shared comprehension of the message's content, clarity, and conciseness. The content has to be specific, to the point, brief and couched in simple, understandable and clear language with no ambiguity. Communication is essential for planning, monitoring, relief efforts, and implementing mitigation strategies. The crises connected to each step as outlined here cannot be managed without efficient communication. Any disaster management plan must have a failsafe communication plan in place to be successful. Disaster relief must be provided right away in order to minimise or repair a major disruption to society's ability to function and to lessen the serious and pervasive threat to people's lives, property, health, or the environment. This threat can be brought on by an accident, the natural world, or human activity and it can also develop suddenly or over time as a result of intricate, multifaceted processes.

ICT 24

Integration of ICT for Agricultural transformation

Hina N. Kadeval
College of Renewable Energy and Environmental Engineering
S. D. Agricultural University, Sardarkrushinagar
Email: hina_280@sdau.edu.in

ABSTRACT

The population of India has already crossed 1.30 billion and still increasing alarmingly and has put a great pressure on the food grain production of India. There are projections that demand for food grains would increase from 265.57 million tonnes in 2015 to 345 million tonnes in 2030. Hence in the next 20 years, production of food grains needs to be increased at the rate of 5.5 million tonnes annually. This poses a major challenge not only for the policy makers but also more directly to the agricultural educationist, scientists and extensionist. ICT in agriculture is an emerging field focusing on the enhancement of agricultural and rural development in India. The advancement in ICT can be utilized for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture. The ICT can generate new openings to bridge the gap between information haves and information have not's in the developing countries. The task force on 'India as Knowledge Superpower' emphasized the need to harness ICTs for community transformation. The agriculturally prosperous developing countries like India cannot overlook agriculture in such transformation. The emerging ICTs have momentous role to perform in agricultural development. There are possibilities of integration of ICT in agriculture for overall agricultural and rural development. Thus, there is a need to understand as to how far the ICT initiatives are able to address the farmers need so that better solution can be provided to address those unmet needs. Paper covers recent advancements in ICT for agricultural and rural development, role of ICT in various entrepreneurial developments, importance of various mobile and web based technology for agricultural and rural development and future prospects.

Technologies and Practices for Sustainable Rural Livelihood including Natural Farming and Climate Smart Extension (SRL)

SRL 1

Farmers' perception about climate change in North Gujarat

S. G. Rathava, G. R. Patel and K. V. Mashaliya
Department of Agricultural Extension & Communication, CPCA, SDAU, Sardarkrushinagar
Email: sunilgrathva@gmail.com

ABSTRACT

Climate change is the global phenomenon of climate transformation characterized by the changes in the usual climate of the planet (regarding temperature, rainfall and wind) that are especially caused by human activities. Multiple random sampling techniques were followed for selection of the districts, talukas, villages and farmers. In the North Gujarat, three districts were selected randomly. From each districts two talukas were selected randomly. Four villages from each talukas were selected randomly. From each village 10 farmers were selected randomly. Thus, total 240 farmers were selected as sample size. The data were collected through personal interview and then after it is compiled, tabulated and analyzed to get proper answer with the help of various appropriate statistical tools. Majority 82.08 per cent of them had medium to high level of perception about climate change. The relationship with farmers' perception was observed positive and significant with age, farming experience, occupation, source of weather forecast, extension participation, mass media exposure, decision making ability. It also observed that positive and highly significant relationship with education, social participation, crop insurance and risk orientation.

SRL 2

Assessment of management practices, resource availability and production performance of *Gaushalas* in South Gujarat

N. B. Patel[1], Durgga Rani. V[2] and G. M. Pandya[3]
[1] Associate Research Scientist, [3] Assistant Research Scientist, LRS, KU, Navsari
[2] Assistant Professor, College of Veterinary Science and A.H., KU, Navsari
Email: nbpatel1978@kamdhenuuni.edu.in

ABSTRACT

The Gaushala movement in India has long been a cornerstone of cattle protection and conservation. This study delves into the management practices, resource availability, and production performance of Gaushalas in South Gujarat. A total of 80 Gaushalas were selected from the seven districts in South Gujarat to obtain a comprehensive overview of their operations. The study revealed that the majority of the Gaushalas in this region have been operational for less than fifty years, with a significant portion under the governance of trusts. Land and water resources are crucial for their functioning, and approximately half of them reported optimal water availability year-round, while 55.00 per cent had access to sufficient grazing or cultivable land. Regarding animal husbandry, most Gaushalas exclusively reared Gir cattle, with herd size ranging from 11 to over 100 animals. However, reproductive performance indicators such as age at first calving and calving intervals suggested room for improvement. In terms of production, 62.50 per cent of Gaushalas produced 21-50 liters of milk per day, with some exceptional cases exceeding 100 liters per day. The best cow in majority of the Gaushalas produced 8-12 liters per day, and average lactation yield fell within the range of 1001-1500 liters. This study sheds light on the significant role Gaushalas play in animal husbandry in South Gujarat and highlights areas where they can enhance their operations, particularly in terms of reproductive performance. The findings provide valuable insights for policymakers and stakeholders interested in promoting sustainable cattle conservation and management practices.

SRL 3

Climate smart agriculture: Making agriculture smart to combat climate change

V. G. Tala, A. B. Dhola and R. U. Chaudhari
Department of Agricultural Extension & Communication, CPCA, SDAU, Sardarkrushinagar
Email: vivektala105@gmail.com

ABSTRACT

Climate is the average weather in a given area over a longer period of time. A climate description includes information such as average temperature in different seasons, rainfall and sunshine. Climate Smart Agriculture (CSA) is an approach for transforming and reorienting agricultural development under the new realities of climate change. According to Food and Agriculture organization (FAO), CSA is "Agriculture that sustainably increases productivity, enhance resilience (adaptation), reduces/removes Green House Gas (mitigation). CSA has been emerged as a novel and strategic approach for resolving the challenges in the agriculture sector and aids in the sustainable improvement of agricultural productivity as well as enhances food security and farmers' resilience and adaptation to climate change. It has been observed that moderate level of awareness and knowledge ability of farmers about climate change. Major impacts of climate change were found on cropping system, harvesting time and water crisis problems such as irrigation water shortage and damaged agro wells were also found. Most of information related to CSA technologies were accessed by the farmers via radio, neighbour farmers friends and relatives. Main constraints in adoption of CSA technologies were lack of sufficient knowledge, awareness and guidance about the CSA technologies. For greater adoption of CSA technologies among farmers to combat climate change, proper awareness and knowledge should be created among the farmers by conducting more demonstrations and training programmes about practically and financially CSA technologies as well as study tours to the successful demonstration plots of farmers practicing climate resilient technologies.

SRL 4

Feeding and housing management practices in *Gaushalas* of South Gujarat: A comprehensive study

N. B. Patel[1], Durgga Rani. V[2], and V. R. Patel[3]
[1] Associate Research Scientist, LRS, KU, Navsari
[2] and [3] Assistant Professor, College of Veterinary Science and A.H., KU, Navsari
Email: nbpatel1978@kamdhenuuni.edu.in

ABSTRACT

The Gaushala movement, dedicated to the protection and preservation of India's cattle wealth, has evolved beyond its traditional role into a multifaceted endeavour. This study investigated the feeding and housing management practices in Gaushalas across South Gujarat, shedding light on critical aspects of their operations. Housing management is crucial for animal well-being, and the study revealed a diverse range of practices. A significant proportion (43.75%) of Gaushalas employed loose housing, providing animals with more freedom. However, challenges in construction were apparent, with 42.50% utilizing sheds with faulty construction. Ensuring adequate space under the roof and loafing areas varied, which affected animal comfort and health. Feeding management emerged as a key concern. A striking 68.75% of the Gaushalas faced insufficient availability of green or dry fodder, potentially impacting animal health and productivity. A considerable number (31.25%) relied solely on crop residues and agricultural waste. Only 12.50% of them consistently provided dry and green fodder. Facilities to store feed were found inadequate, where 33.75% were having low-capacity storage godowns. Concentrate feed practices showed room for improvement, with 26.25% using home-made mixtures of low nutritive value. Practices to make ration balanced was seen only in 31.25% of the Gaushalas, highlighting the potential for enhanced nutritional practices. In terms of adopting

nutritional technologies, more than half (55.00%) of the gaushala's regularly offered mineral mixtures, while urea treatment and silage making were uncommon (10.00% and 12.50%, respectively). A significant knowledge gap existed regarding hydroponics fodder production, with 70.00% being unaware of this technology. This study underscored the importance of addressing housing, feeding, and nutritional management practices to improve the health and productivity of cattle in Gaushalas. It provides valuable insights for Gaushala administrators and policymakers, offering a foundation for enhancing the quality of care for these sacred animals.

SRL 5

ITK practices adopted by professional breeders of Kankrej cattle

J. H. Patel and R. J. Modi
Assistant Professor
Livestock Farm Complex, College of Veterinary Science & A. H., KU, Anand

ABSTRACT

The present survey was planned to study package of practices adopted by professional breeders of Kankrej cattle in Banaskantha district. A total 150 professional breeders were interviewed based on well prepared questionnaires from five taluka and five villages of each taluka of the district. The study found that majority (89.70 %) of professional breeders applied ethno-veterinary practices for anoestrus animals. Among them 42.00, 17.30, and 30.00 per cent utilized Bajara + math + Guwarbhardo + Banasdan, Bhiloma + Banasdan and Soyabean oil or mustered oil, respectively. Rest of 10.60 per cent of the professional breeders did not care about anoestrus animals and leave it for nature. One third professional breeders were adopted ITK practices for repeat breeder animals after successful mating. The practices included drenching of castor oil (15.30 %), juice of fennels (5.00 %), kept mixture of turmeric powder and garlic in front of cervix (5.00 %). These types of practices applied due to belief that cows did not conceive due to excess of heat in the body which does not allow to fertilize the cows and these practices reduce the heat in the body and make the cow cool. Very meager respondents did not allow the cows for sitting and not allow drinking water after mating for 4 to 6 hours. It was due to belief that cows throw away semen from genital tract due to sitting or pressure created with drinking of water.

SRL 6

Feedback of farmers about GNP 2 variety of pegionpea in Bharuch district

H. U. Vyas, R. D. Dhandhukia and G. Netravathi
Department of Agricultural Extension & Communication, COA, NAU, Bharuch
Email: huvyas@yahoo.com

ABSTRACT

Seed is the most important input for farmer. Seed plays an important role in crop production. Navsari Agricultural University provides the quality seeds of different major crops to the farming community. Among all the pulse crops, pegionpea is the most important crop. The NARP, NAU, Bharuch Centre satisfied the needs by providing improved variety seed of pegionpea GNP 2 in South Gujarat. Hence, it was necessary to know the feedback of the farmers about the technological traits of the variety GNP 2 in Bharuch district. With this back ground the present study was conducted in the year 2021-22 and 2022-23 with sample size of 300 farmers. In case of feedback about GNP 2 variety of pegionpea, it has more test weight, enough plant height with biomass as well as greenish color pod and attractive to consumers, good pod length with more number of grains, it is good for vegetable as well as dry grain yield purpose as compared to other varieties, it has continuous flowering after picking of green pod, the grain size is bold, white and round, least infection against wilt disease, least infection against sterility mosaic disease, grains of GNP 2 has a very good *turdal* cooking

quality and least infection against phytophthora (stem rot) were the feedbacks received from the farmers about GNP 2 variety of pegionpea in study area.

SRL 7

Development of scale to measure attitude of farmers towards family farming

Pankaj Singh, Patel, M. R. and Patel, J. B.
Department of Agril. Extension & Communication, BACA, AAU, Anand
Email: pankaj56402@gmail.com

ABSTRACT

Family farming has a huge contribution in the total food grain production of the country. We can't feed our population without active involvement of farmers in family farming occupation. For understanding the attitude of farmers towards family farming, attitude scale was developed. In initial stage for developing the scale, 36 statements were collected from the relevant literature, and consulting major advisor, experts and extension personnel. The statements, thus selected, were edited on the basis of the criteria suggested by Edward (1957) and finally, 28 statements were selected as they were found to be non-ambiguous and non-factual. Based on the median and Q values, 20 statements were finally selected to constitute attitude scale. The test was found to be reliable (0.85) and valid.

SRL 8

Household food security by kitchen gardening and nutrition gardening at Amreli

Neha Tiwari[1], N. S. Joshi[2] and Jiju N. Vyas[3]
[1] Scientist, [2] Senior Scientist & Head, KVK, JAU, Amreli
[3] Senior Scientist & Head, KVK, JAU, Nanakandhasar
Email: nehatiwari@jau.in

ABSTRACT

Child and maternal malnutrition are the most serious health risks in India, accounting for 15% of the country's total disease burden. Malnutrition and poor health status especially in rural areas is a common problem. It retards children growth, increases the risk and duration of illness, reduces work output, and slows social and mental development. As per the recent report of National Family Health Survey (NFHS) – 4 conducted by Ministry of Health and Family Welfare in 2015-16, 22.9% women (15-49 years of age) are underweight (BMI less than 18.5 kg/m^2). The five States having highest percentage of malnutrition among women are Jharkhand (31.5%), Bihar (30.4%), Dadra and Nagar Haveli (28.7%), Madhya Pradesh (28.4%), Gujarat (27.2%) and Rajasthan (27%). Malnutrition among women of reproductive age increases the risk of mortality during labour and delivery and puts their newly born children at risk of long-term deficiencies. Improving nutritional status, including micronutrient status, can lead to increased productivity, increased child survival and growth, and reduced maternal morbidity and mortality. To overcome this problem, Kitchen Garden is considered to be the best possible solution. The present study was conducted in 5 village adopted by KVK, JAU, Amreli from Amreli district. Kitchen Gardens kits were distributed in all the 5 villages of district making the involvement of 100 farm families. Average production of all the vegetables in kitchen garden was found to be 267 kg. for the *Kharif* 2022 season. Average saving procured was Rs. 10670 through kitchen garden farm families get fresh and organic vegetables year round and their nutritional needs are fulfilled. Through kitchen garden empowerment of women also addresses a priority area of poverty alleviation and provides important socio-economic returns through lower health and welfare costs, lower fertility and lower maternal and infant mortality rates.

SRL 9

Relationship between profile of the farmers and their attitude towards family farming

Singh Pankaj, Patel, Mahesh. R. and Vijay B. Patel
Department of Agril. Extension & Communication, BACA, AAU, Anand
Email: pankaj56402@gmail.com

ABSTRACT

Agriculture plays a vital role in the Indian economy with over 58.00 per cent of the population dependent on agriculture as their main source of income. We can't feed our population without the active involvement of farmers in family farming occupation. Our country is now facing a dual challenge of shrinking agricultural land and increasing population to feed. Inflation increases the cost of cultivation and ultimately reduces net income of the farmers so they remain in distress. Witnessing this trend in agriculture the young generation would not like to adopt family farming as their occupation. In such a situation it becomes necessary to study the relationship between profile of the farmers and their attitude towards family farming. The result of study revealed that out of fifteen independent variables the variables *viz*; age, farming experience, landholding, annual income, achievement motivation, economic motivation, risk orientation and extension contact, of the farmers had positive and highly significant correlation with their attitude towards family farming. The variables like educational qualification and mobile exposure of the farmers had negative and significant correlation with their attitudes towards family farming. The variables like herd size and scientific orientation had positive and significant correlation with the attitude of the farmers towards family farming. Moreover, the variables like social participation, size of the family and agricultural mass media exposure of the farmers had a positive and non-significant relationship with their attitude towards family farming.

SRL 10

Adaptation strategies initiated by farmers to climate change in North Gujarat

Sunil Rathava, G. R. Patel and P. H. Patel
Department of Agril. Extension & Communication, CPCA, SDAU, Sardarkrushinagar
Email: sunilgrathva@gmail.com

ABSTRACT

Climate change is the global phenomenon of climate transformation characterized by the changes in the usual climate of the planet (regarding temperature, rainfall and wind) that are especially caused by human activities. Multiple random sampling techniques were followed for selection of the districts, talukas, villages and farmers. In the North Gujarat, three districts were selected randomly. From each districts two talukas were selected randomly. Four villages from each talukas were selected randomly. From each village 10 farmers were selected randomly. Thus, total 240 farmers were selected as sample size. The data were collected through personal interview and then after it is compiled, tabulated and analyzed to get proper answer with the help of various appropriate statistical tools. In the research study major findings was more than three-fifths (62.08%) of the farmers had medium level of adaptation strategies followed by 20.42 per cent of them had high level of adaptation strategies and 17.50 per cent of the farmers had low level adaptation strategies. The majority 85.42 per cent of the farmers were adopt crop diversification and alternate cropping system used in their area it secured I rank followed by 83.75 per cent and 83.33 per cent of the farmers were adopt short duration varieties for dry land area and contingency crop planting it secured II and III rank, respectively.

SRL 11

An analysis of socio-personal characteristics of cotton growers

D. A. Padaliya[1], N. B. Jadav[2] and N. M. Pithiya[3]

[1] Ph.D. Scholar, Dept. of Agril. Extension Education, COA, JAU, Junagadh

[2] Directorate of Extension Education, JAU, Junagadh

[3] Agriculture Officer, Department of Agronomy, COA, JAU, Junagadh

Email: darshanapadaliya4257@gmail.com

ABSTRACT

Agriculture is an important occupation of rural people and it is the backbone of the economy of many countries. Cotton is most important fibre crop in Indian agriculture and India ranks first with respect to area and production and eighth rank with respect to productivity of cotton. Consumption of pesticides is particularly high in cotton cultivation as the crop yield is seriously affected by pest attacks. Pesticides overuse can contaminate soil, water, turf, killing insects, beneficial insects, non-target plants and also create health hazard in human. So considering this fact to know cotton growers profile present study was conducted in Rajkot, Amreli and Jamnagar district of Saurashtra region. Six talukas were selected randomly and two villages were selected randomly from each selected taluka and twelve respondents were randomly selected from each village. Thus, 144 cotton growers were selected for the study. The study revealed that majority of the respondents were (52.08%) belonged to middle age group, 36.11 per cent belonged to middle school (9th to 10th standard) level of education, 31.25 per cent had high farming experience, 35.42 per cent had medium level of health value, 34.72 per cent had semi medium size of land holding (2 ha to 4 ha), 31.25 per cent had annual income ₹ 1,00,001 to ₹ 1,50,000, 59.02 per cent had medium environmental orientation, 63.20 per cent had medium level of sustainability, 35.41 per cent had high risk orientation, 40.30 per cent had medium Economic motivation, 37.50 per cent had high scientific orientation, 35.42 per cent had high innovativeness, 65.28 per cent had medium mass media exposure and 61.80 per cent of cotton growers had medium source of information.

SRL 12

Awareness about climate change among the farmer friends

G. K. Bhabhor[1], A. A. Shaikh[2] and R. G. Machhar[3]

[1] Scientist, KVK, AAU, Dahod, [2] RA, ARS, AAU, Dahod

[3] Unit head & Asso. Research scientist, ARS, AAU, Dahod

E-mail: gaurangbhabhor890@gmail.com

ABSTRACT

Climate change is a burning issue in the global discussions on agriculture as it affects all other sectors of development. Agriculture system responds to changing climate through the process of adaptation. Awareness of farmers about the climate changes, its causes and consequences are the important aspect to deal with changing climatic conditions. Despite availability of adaptation measures like HYVs, mixed cropping, integrated farming, change in irrigation, crop insurance etc., farmers were not adapting them due to lack of knowledge and awareness about climate change. Among the different extension functionaries farmer friends are the key communicator for dissemination of agriculture technologies therefore awareness of them about the climate changes is very important. Total 300 farmer friends from Dahod District of Gujarat were selected randomly. Majority of the respondents were aware of the major indicators of climate change *i.e.* irregular rainfall and increase in temperature. In case of awareness about the causes of climate change it was deforestation, use of vehicles, while awareness about the major impact were found as human disease outbreak and livestock disease outbreak. Overall awareness about climate change was high to very high. Majority of respondents had a very high level of risk perception in agriculture due to climate change.

SRL 13

Consciousness of dairy farmers about bovine tuberculosis as neglected Zoonosis

S. J. Jadav[1] and J. K. Patel[2]

[1] Dairy Vigyan Kendra, SMC College of Dairy Science, Kamdhenu University, Anand

[2] Extension Education Institute, AAU, Anand

Email: sanjay.jadav89@gmail.com

ABSTRACT

The study was carried out with randomly selected 180 dairy farmers from 36 villages of 6 talukas of Panchmahals and Mahisagar districts of Gujarat. Most dairy farmers (95.00%) had high to very high consciousness about bovine tuberculosis. The majority of dairy farmers had a medium to high level of knowledge (71.11%), a very high level of sensitivity (77.78%), and a favorable to most favourable attitude (95.55%) towards the control of bovine tuberculosis. Path analysis shows the maximum positive direct effect exerted by scientific orientation, mass media exposure, and education. Economic motivation, extension participation, and training exerted maximum indirect positive effects. Dairy farmers can enhance their consciousness about bovine tuberculosis through formal education and participation in social-extension activities using mass media, the internet, and other psychological variables. The research findings serve as a guideline for training institutions, researchers, planners, extension agencies, and concerned organizations to form effective and realistic training programmes to impart consciousness amongst dairy farmers about tuberculosis and other zoonoses.

SRL 14

Constraints and suggestions on effective use of nauroji novel organic liquid nutrient in fruit and vegetable crops of South Gujarat

H. A. Parmar[1] and Netravathi G.[2]

[1] Department of Extension Education, NMCA, NAU, Navsari

[2] Department of Extension Education, College of Agriculture, NAU, Bharuch

Email: hardikextn@gmail.com

ABSTRACT

Fertilizer plays a significant role in increasing crop yield and helps to ensure food security in any country. Nevertheless, the excessive use of fertilizer has led to several environmental impacts including pollution and groundwater contamination in different parts of the world. In the present scenario, most agricultural lands have been used for more than 100 or several years for agricultural purposes. Because of this continuous usage of lands and the application of chemical fertilizer, soil quality is being declined. Agricultural practices are increasingly leaning towards committing to a sustainable environment. Many are practicing environmental-friendly practices are in practice; such as using organic liquid fertilizer/nutrients instead of the synthetic alternative. Trend of organic farming is increasing day by day and it is the most urgent need to human being. Navsari Agricultural University is also working on organic farming concept and regularly updating package of practices of different crops through organic inputs. The study was conducted in Navsari and Bharuch district of South Gujarat. A purposive random sampling method was used for selection of respondents using Nauroji Novel. Two districts were selected for the study *viz*; Navsari and Bharuch. Total 30 Nauroji Novel users farmers and 30 non-Nauroji Novel users farmers were selected from each district. Thus, total of 120 respondents were selected. Ex-post facto research design was used for the study. Major constraint faced by user respondents were non-availability of Organic Liquid Nutrient (OLN) locally at times when needed and at appropriate content was ranked first followed by slow action of OLNgot second rank and lack of reinforcement efforts from the university ranked third. Major suggestions offered by respondents were agreed on availability of OLN in Villages ranked first followed by technical aspects on OLN should be

provided by extension agencies was rank second and awareness campaign on popularization of OLN by KVK or other extension institutions ranked third.

SRL 15

Determinants of adaptation strategies to climate variability among farmers in Gujarat

Nikita Pokiya and B. Swaminathan
Department of Agricultural Economics, College of Agriculture, JAU, Gujarat
Email: nikitapokiya95@gmail.com

ABSTRACT

The implications of climate variability, be it the delay in seasonal rainfall; its unexpected arrival during the reproductive phase of the crops, or even the increase in night temperature, continue to strike the farmers financially, forcing them to rethink farming as a viable proposition. Nevertheless, the farmers try to cope with or counter climate change effects with adaptation strategies. The present study involving a sample size of 240 farmers from Gujarat, India, employed the multinomial logit model to determine the factors influencing their adaptation strategies to climate change. The findings revealed that among the socio-economic variables, the age of the farmers influenced all the adaptation strategies except the practice of inter/mixed cropping in the study area. For instance, the older the farmers the more they were prone to adopt 'digging/deepening of wells' as a climate change adaptation strategy when compared with that of a base strategy of no adaptation. Farm income was also found to be significantly triggering all the adaptation strategies. For every one-unit increase in farm income, the probability of changing the cropping calendar increased by 2.005 times; taking up of micro-irrigation by 1.379 times; practicing inter/mixed cropping by 1.093 times, and digging / deepening of wells by 1.058 times. The study offers the scope to understand why and how farmers continue to take up farming despite facing complications imposed by climate change.

SRL 16

Perception of cotton growers towards pesticides usage

D. A. Padaliya[1], N. B. Jadav[2] and Tummala Naga SatyaSaiSrivani[3]
[1] and [3] Ph.D. Scholar, Dept. of Agril. Extension Education, CoA, JAU, Junagadh
[2] Directorate of Extension Education, JAU, Junagadh
Email: darshanapadaliya4257@gmail.com

ABSTRACT

Cotton is one of the most important fibre crops of India and plays a dominant role in the industrial and agricultural economy of the county. Saurashtra is a predominant cotton growing region in Gujarat, where more per cent of cultivated area is under cotton cultivation. In cotton cultivation, pesticide use is an essential part of production technology and excessive and injudicious use of pesticides has led to development of resistance in sucking pest, decrease the efficiency of the pesticides which turn to lowering of profit per annum and also responsible for degradation of soil. Considering the above facts, it seems worthwhile to know the level of perception of farmers about the pesticide's usage. The study was conducted in Saurashtra region with 144 cotton growers. The result of study revealed that less than two fifth (36.11 %) of cotton growers were from high level of perception about pesticides usage in cotton crop. The profile characteristics like education, health value, sustainability, environmental orientation risk orientation, economic motivation, innovativeness, farming experience, annual income, scientific orientation, mass media exposure and source of information were positively and significantly associated with perception of cotton growers about pesticides usage, while age is negative and significantly related with perception level of cotton growers about pesticides usage. For increase per annum profit and effective plant protection technology transfer, extension

functionaries may suggest to select educated, young and more cotton growing experienced farmers for imparting training.

SRL 17

Attitude of small and marginal farmers towards agricultural diversification

R. B. Rathod[1], B. N. Kalsariya[2] and N. U. Kalasariya[3]

[1] and [3] Senior Research Fellow, Extension Education Institution, AAU, Anand

[2] Professor and Head, Dept. of Agril. Extension, JAU, Junagadh

Email: rrb4289@yahoo.com

ABSTRACT

This present study was conducted with a sample of 252 small and marginal farmers selected from Gujarat state. The ex-post facto research design was used for the research study. The result found that about three-fifth (57.14 %) of small farmers had medium level of attitude towards agricultural diversification, followed by 21.43 per cent, 13.49 per cent, 6.35 per cent and 1.59 per cent of them had high, low, very high and very low level of attitude towards agricultural diversification. In case of marginal farmers, less than half (48.41 %) of marginal farmers had medium level of attitude towards agricultural diversification, followed by 30.16 per cent, 16.67 per cent and 4.76 per cent of them had low, high and very low level of attitude towards agricultural diversification, respectively. Whereas, none of them was found very high level of attitude towards agricultural diversification .

SRL 18

Attitude of tribal farmers towards organic farming practices in Dangs district

N. U. Kalasariya[1], R. M. Naik[2] and R. B. Rathod[3]

[1] and [3] Senior Research Fellow, Extension Education Institution, AAU, Anand

[2] Principal and Dean, NMCA, NAU, Navsari

Email: kalsariyaneeta9@gmail.com

ABSTRACT

Organic farming is a modern and a tenable form of agriculture that provides consumers fresh natural farm products. The popularity of organic product is increases day by day dramatically as consumer seeks the organic foods that are thought to be healthier and safer. Thus, organic food perhaps ensures products safety from farm to plate. The present study was conducted in Dang district of South Gujarat in the year 2020. All three talukas of the Dangs district were covered under the study. Total 12 villages were selected through proportionate random sampling. From each village ten tribal farmers were selected through simple random sampling. Hence, the total respondents were 120. The majority of the tribal farmers had favourable attitude of organic farming and annual income and management orientation are positively and highly significant association at 1 per cent of probability while, education, herd size, social participation, extension contact, economic motivation, scientific orientation, risk orientation and mass media exposure were found positively and significantly associated at 5 per cent level of probability whereas, size of family, farm experience, land holding, and occupation are negatively but non-significantly associated with their attitude towards organic farming.

SRL 19

Knowledge level of research community of NAU regarding global warming effect on agricultural sector

P. H. Trapasiya[1], N. M. Chauhan[2], K. L. Chaudhary[3] and R. M. Bhuva[4]

[1]M.Sc. (Agri.) student, [3] and [4] Assistant Professor

Department of Agricultural Extension and Communication, NMCA, NAU, Navsari

[2] Director of Extension Education, NAU, Navsari

Email: kalpeshjudal@gmail.com

ABSTRACT

Now-a-days, global warming is an important factor impacting agricultural sector and most importantly impacting agricultural production. Decline in agricultural production negatively affect the livelihood of farming community and ultimately affect their standard of living. Knowledge about global warming and how it affects the agriculture help research community to use appropriate practices and technology that is suitable in changing weather condition. The study was conducted in all research centers available under Navsari Agricultural University of south Gujarat during the year 2021-22. Random sampling method was followed for selection of the respondents; from each research center respondents were selected randomly. In this way the sample size for the study comprised for 120 respondents. Ex-post facto research design was used. Twenty independent and one dependent variable were chosen. In light of the objectives, the interview schedule was prepared and respondents were interviewed at their research center and field. The collected data were analyzed by using frequency, percentage, rank, arithmetic mean, standard deviation and correlation coefficient. Majority of the respondents had moderately favourable attitude toward global warming and medium level of general knowledge about global warming.

SRL 20

Knowledge of tribal farmers towards organic farming practices

N. U. Kalasariya[1], R. M. Naik[2] and R. B. Rathod[3]

[1] and [3] Senior Research Fellow, Extension Education Institution, AAU, Anand

[2] Principal and Dean, NMCA, NAU, Navsari

Email: kalsariyaneeta9@gmail.com

ABSTRACT

The present study was conducted in Dangs district of South Gujarat during the year 2020. All of the 3 talukas of the Dangs district were covered under the study. Twelve villages were selected through proportionate random sampling. From each village ten tribal farmers were selected through simple random sampling. Hence, the total respondents were 120. The result was found that tribal farmers had a majority of respondents had medium level of the knowledge of organic farming. The extension contact, scientific orientation and mass media exposure was found positively and highly significantly associated at 1 percent level of probability whereas, education, farm experience, annual income, social participation, economic motivation, risk orientation, management orientation and occupation are positively and significantly associated at 5 percent level of probability with their knowledge regarding organic farming.

SRL 21

Livelihood security of small and marginal farmers towards agricultural diversification

R. B. Rathod[1], B. N. Kalsariya[2] and N. U. Kalasariya[3]

[1] and [3] Senior Research Fellow, Extension Education Institution, AAU, Anand

[2] Professor and Head, Dept. of Agril. Extension, JAU, Junagadh

Email: rrb4289@yahoo.com

ABSTRACT

This present study was conducted with a sample of 252 small and marginal farmers selected from Gujarat. Ex-post facto research design was used for the research study. Livelihood comprises the capabilities, assets and activities required as the means of living. A livelihood is considered secure when it can cope up with and recover from stress or shocks and maintain or enhance its capabilities and assets. In the present study, livelihood security was operationalized as adequate access to food and nutrition, health facilities, clean environment, habitat facilities, educational opportunities, community participation and social integration. The result found that nearly three-fifth (58.73 %) of small farmers had medium level of livelihood security, followed by 26.98 per cent of farmers had high and 14.29 per cent of them had low level of livelihood security, respectively. In case of marginal farmers, more than half (53.97 %) of farmers had medium level of livelihood security, followed by 30.16 per cent and 15.87 per cent of them had low and high level of livelihood security, respectively.

SRL 22

Relationship between livelihood security and profile of farmers in coastal area of Saurashtra region

J. V. Chovatia[1], V. M. Savaliya[2] and P. N. Panchani[3]

[1] Assistant Professor, Dept. of Agril. Extension, CoA, JAU, Junagadh

[2] Assistant Professor, Department of Horticulture, CoA, JAU, Porbandar

[3] Ph.D. Scholar, PGIABM, JAU, Junagadh

Email: jvchovatia@jau.in

ABSTRACT

Livelihood is the means that the people use to support themselves, to survive and to prosper. Livelihood is an outcome of how and why people organize to transform the environment to meet their needs through technology, labour, power, knowledge, and social relations. Coastal salinity is and would continue to be the great menace to sustainable crop production in the Gujarat state. Soil and water salinity problems are the major factors that are responsible for attaining better livelihood security. What's more, their living options and conditions are getting from bad to worse. In this study, 120 respondents were selected from 12 different villages on the basis of 5 km from the coastal belt of three districts Porbandar, Junagadh and Gir-somnath by applying multistage purposively random sampling technique. With respect to characteristics, 47.50 per cent of respondents were from middle age group, 37.50 per cent respondents had education up to middle school level, 37.50 per cent respondents were having joint family and had 5 to 6 members in their family, 50.00 per cent of respondents was small size of land holding and 58.33 per cent of coastal area farmers had farming + allied as an occupation, 35.00 per cent of respondents had medium annual income, 48.33 per cent of the respondents belongs to OBC caste. Whereas, with respect to social participation (63.33 %), economic motivation (63.33 %), management orientation (56.67 %), credit orientation (65.00 %) and resource use management behaviour (77.50 %), coastal area farmers were in the group of medium level. There was positive and highly significant relationship between education, size of land holding, occupation, annual

income, economic motivation, resource use management behaviour and their livelihood security and also had positive and significant relationship between management orientation and credit orientation with their livelihood security. The characteristics of the respondents like age, family size, caste and social participation had non-significant relationship with the livelihood security.

SRL 23

Socio-economic analysis and perception of groundnut growers about natural farming in Junagadh district of Gujarat

V. R. Chudasama, L. R. Dubey, N. V. Faldu and N. G. Savaliya
College of Agribusiness Management, SDAU, S. K. Nagar
Email: laxmirani.d@sdau.edu.in

ABSTRACT

The present study was carried out in Maliya, Keshod, Mangrol and Mendarda, talukas of Junagadh district, which were selected purposively. Multistage sampling technique was used and a total of 120 NF (Natural Farming) groundnut growers were selected for the study. The primary data were collected through personal interviews with the help of a structured schedule. Analytical tools like simple tabular method, CACP cost concept and likert scale were used to attain the objectives of a research study. Results showed that majority of growers belonged to middle age group. Most of them were educated up to the middle-class level and most of the growers belonged to the nuclear type of families which consisted of up to 5 members in family. Majority of growers (95.00%) were married and 81.67 per cent growers were having up to 5 years of experience in natural farming. Annual income of groundnut growers from the natural farming was reported between ₹ 161826 - ₹ 329917 lakh. Most of the growers belonged to semi-medium of land holding category and open well was the main source of irrigation. Majority of growers were having membership with ATMA and more than half (55%) of the growers were getting benefits from *Desi Gay SahayYojana*. The cost of cultivation (Cost C2) was worked out to be (₹ 85902.21), which included the Cost A ₹ 48401.85, Cost B ₹ 68922.44 and Cost C1.

SRL 24

Buffalo calf mortality and its patterns in the operational area of Dairy Vigyan Kendra, Vejalpur

S. J. Jadav[1], J. K. Patel[2] and V. M. Chaudhary[3]
[1] Dairy Vigyan Kendra, SMC College of Dairy Science, Kamdhenu University, Anand
[2] Extension Education Institute, Anand Agricultural University, Anand
[3] PG student, College of Veterinary & A.H., Anand
Email: sanjay.jadav89@gmail.com

ABSTRACT

The study aimed to know the buffalo calf mortality and its patterns in the operational area of Dairy Vigyan Kendra (DVK), Vejalpur, Gujarat, India. Using the simple random sampling method, 240 buffalo owners from 24 villages of 6 talukas from the operational area of Dairy Vigyan Kendra were selected. The data were collected based on the interview schedule. The majority of buffalo owners had not adopted the different management practices viz., provision of milk replacer, calf starter, mineral mixture, salt, deworming agent at every month up to six months and vaccine. An overall buffalo calf mortality was observed 24.26% in the study area. There was a higher mortality rate in male calves (45.00%) than female buffalo calves (14.58%) because of negligence towards the male calf. The mortality rate observed was higher during the first three months of age (90.98%) and during winter (45.08%). A negative and significant relationship was observed between some important calf rearing practices like colostrum feeding time, providing milk replacer, calf

starter, concentrate feed, mineral mixture, dewormer, and vaccines to calves with female buffalo calf mortality. Participation in various animal husbandry training programs and adoption of scientific management practices to large herd size farms will be helpful to reduce female buffalo calf mortality rate at the field level.

SRL 25

Attitude of farmers towards organic farming in Jalalpore taluka of Navsari district

Preeti Tetarwal[1], O. P. Sharma[2] and Vinod Kumar[3]

[1] Ph.D. Scholar, Dept. of Extension Education, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur - 333001

[2] Professor & Head, [3] M.Sc. Scholar, Dept. of Agricultural Extension & Communication, N. M. College of Agriculture, Navsari Agricultural University, Navsari - 396450

Email: preetitetarwal001@gmail.com

ABSTRACT

In India, traditional farming practises have been passed down from generation to generation since the Indus Ganges civilisation. Traditional knowledge and practises, however, were incapable of producing enough to maintain the enormous and rising population. The reliance on other countries for food supplies prompted a demand for self-sufficiency through agricultural modernization. The green revolution altered the nation's food production scenario. The country is now transitioning from a food-importing nation to a food-exporting nation. However, this transition has had a significant influence on the environment, which is detrimental to people's well-being. As a result, the demand for a suitable approach that meets our needs has been felt for a long time. The present study was conducted in Jalalpore *taluka* of Navsari district. Jalalpore taluka comprises of 73 villages out of which 5 villages namely Eru, Bhutsad, Aat, Dandi and Matwad were selected following simple random sampling Ten farmers were selected as respondents from each village following simple random sampling technique. Thus, 50 farmers were selected as respondents for present study. The study found that 68.00 per cent of the respondents had favourable attitude towards organic farming.

SRL 26

Knowledge level of farmers about global warming effect on agricultural sector

N. L. Parikh[1], N. M. Chauhan[2] and Patel, J. B.[3]

[1] Ph.D. Scholar, AAU, Anand

[2] Director of Extension, Navsari Agricultural University, Navsari

[3] Professor and Head, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

ABSTRACT

Global warming, exemplified by a peak CO_2 concentration of 403.2 ppm in 2020, poses a pervasive threat to various sectors, notably impacting India's agricultural industry, constituting 20% of the GDP. Climate change has resulted in a significant 1.5% loss in this sector, adversely affecting both production and productivity. The study utilized an *ex-post-facto* research method to evaluate farmers' knowledge regarding the impact of global warming on farm production and productivity. Study was conducted in all six talukas of Navsari district. From each taluka, 2 villages were selected randomly resulting sample size of 120. Employing questionnaires as the primary data collection tool, findings revealed that 70% of respondents possessed a medium knowledge level, with 19.17% and 10.83% having low and high knowledge levels, respectively, regarding global warming's effects on the agricultural sector. These results offer valuable insights for policymakers to formulate effective strategies addressing global warming and empower farmers in developing innovative solutions for future agricultural challenges linked to climate change.

SRL 27

Agrivoltaic system for the synergy among crop production and solar electric power generation

Vinit V. Modi[1], N. N. Desai[2] and U. D. Dobariya[3]

[1] Ph. D. Research Scholar, ADIT, CVM, Gujarat

[2] and [3] Assistant Professor, CREEE, SDAU, S. K. Nagar

Email: vmmodee@gmail.com

ABSTRACT

The agrivoltaic system combines agriculture and solar photovoltaic power generation. It provides the farmers with access to quality eco-friendly power and crop production from the same land. The main objective is to study the performance of agrivoltaic systems for different geometry of solar photovoltaic strings and their suitability for agricultural practices and crop parameters. This study aimed to identify compatible solar string patterns for the green gram crop under agro-climatic conditions of the North-Gujarat region. This study designed eight equal-capacity strings with unique geometry to compare power generation performance and crop production suitability. An experiment was conducted considering nine treatments (Eight treatments combining eight strings and green gram crop beneath the strings, and the ninth was open field (control) treatment. Results revealed that the first three treatments had strings 10.5 feet in height, continuous, equal spacing, and chessboard pattern solar panels, respectively, were suitable for power generation and green gram cultivation. These geometries were found better for ease of operations for tractors and other farm activities, improved moisture retention, higher seed yield, and better net realization. Treatment-1 (10.5 feet string with continuous solar panel pattern) provided the highest gross income from power generation and green gram yield (₹ 24364.00). In terms of net realization, treatment-4 (6.0 feet string with continuous pattern) provided the highest net return of ₹ 12417.00, as the capital cost was less for the system. Treatment-5, which involved transparent panels was found to be better for the photosynthesis process of the green gram crop, as it provided the highest yield (12.99 kg) under the agrivoltaic system.

SRL 28

Attitude of farmers towards family farming

Singh Pankaj[1], Patel, Mahesh. R.[2] and Vijay B. Patel[3]

[1] PG Student, BACA, AAU, Anand

[2] Assoc. Professor, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

[3] Asstt. Research Scientist, RRS, AAU, Anand

Email: Pankaj56402@gmail.com

ABSTRACT

Agriculture plays a vital role in the Indian economy with over 58.00 per cent of the population dependent on agriculture as their main source of income. We can't feed our population without the active involvement of farmers in family farming occupation. In such a situation it becomes necessary to know the attitude of the farmers towards family farming. The study was undertaken in the Kheda district which comprises ten talukas. Out of ten talukas, five talukas namely Vaso, Matar, Mahamdabad, Nadiad, Kheda have been selected randomly. From each taluka two villages have been selected randomly. Further, from each selected village twelve farmers have been selected on random basis for the purpose of study. Thus, a total of 120 farmers have been selected for the study. The result of the study inferred that slightly more than two-fifth (41.67 %) of the farmers had neutral attitude towards family farming, followed by 23.33 per cent, 22.50 per cent, 9.17 per cent, 3.33 per cent had favourable, unfavourable, highly favourable and highly unfavourable, respectively. It can be concluded that the majority (65.00 %) of the farmers had a neutral to favourable attitude towards family farming.

SRL 29

Biological treatment of dairy wastewater for bio-fertilizer production

Nitin B. Cholkar and Rajkumar S. Sonwane
Yeshwant Mahavidyalaya, Nanded, India.
Email: nitincholkar84@gmail.com

ABSTRACT

Dairy waste water is a major environmental pollutant. Dairy wastewater contains high levels of organic matter, nutrients, and pathogens. Biological treatment is a promising method for treating dairy wastewater and producing bio fertilizers. Biological treatment processes use microorganisms to break down the organic matter in dairy wastewater. This can be done in aerobic or anaerobic conditions. Aerobic treatment uses oxygen to break down the organic matter, while anaerobic treatment does not require oxygen. Bio fertilizer is a nutrient-rich liquid or solid material that can be used to improve plant growth. It is produced by the microorganisms that are used to treat dairy wastewater. Bio fertilizers can be used to replace chemical fertilizers, which can help to reduce environmental pollution. This paper reviews the different biological treatment processes for dairy wastewater and their potential for producing bio fertilizers. The paper also discusses the challenges and opportunities associated with this technology.

SRL 30

Climate change, its impact and mitigation strategies

Pimpalkar R. D. and Ahire M. C.
Department of Agricultural Extension Education
Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri
Email: rupalipimpalkar2005@gmail.com

ABSTRACT

Climate change is defined as the shift in climate patterns mainly caused by greenhouse gas emission. Green house gas emission cause heat to be trapped by the earth's atmosphere and this has been the main driving force behind global warming. IPCC Climate change 2023 Synthesis Report stated that the Global surface temperature in the first two decades of the 21st century was 0.99 [0.84 to 1.10]°C higher than 1850-1900. Global surface temperature has increased faster since 1970 than in any other 50 year period over at least the last 2000 years. The likely range of total human-caused global surface temperature increase from 1850-1900 to 2010-2019 is 0.8°C to 1.3°C, with a best estimate of 1.07°C. Climate change is one of the biggest challenges to the world in present times. It is defined as significant changes in the average values of meteorological elements, such as precipitation and temperature, for which averages have been computed over a long period. The past few decades indicate that significant changes in climate at a global level were the result of enhanced human activities that altered the composition of the global atmosphere. The concentration of greenhouses gases such as methane (CH_4), carbon dioxide (CO_2) and nitrous oxide (N_2O) have been increased by 150%, 40% and 20%, respectively since 1750. Carbon dioxide emissions, which account for the maximum proportion of greenhouse gases, rose to 36.14 billion metric tons in 2014 from 22.15 billion metric tons in 1990.

SRL 31

Constraints faced by the farmers in family farming

Singh Pankaj[1], Patel, Mahesh. R.[2] and Vijay B. Patel[3]

[1] PG Student, BACA, AAU, Anand

[2] Assoc. Professor, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

[3] Asstt. Research Scientist, RRS, AAU, Anand

Email: Pankaj56402@gmail.com

ABSTRACT

Agriculture plays a vital role in the Indian economy with over 58.00 per cent of the population dependent on agriculture as their main source of income. Inflation increases the cost of cultivation and ultimately reduces net income of the farmers so they remain in distress. Keeping in view the importance of family farming in national production of food grains this study was conducted in Kheda district. Out of ten talukas, five talukas namely Vaso, Matar, Mahamdabad, Nadiad, Kheda had selected randomly. From each taluka two villages have been selected randomly. Further, from each selected village's panchayat office twelve farmers have been selected on random basis for the purpose of study. Thus, a total of 120 farmers have been selected for the study. The constraints obtained from each respondent were measured in terms of mean value. To know their degree of importance, respondents were asked to give their responses in a three-point continuum *i.e.*, Very important, important and less important. Results of the study revealed that the major constraints faced by the farmers in family farming in descending order of rank were, Risk of hunger in the family in case of crop failure when it is taken as family occupation (Rank I). Fragmentation of land reduces land holding in successive generations thus decreasing production and income also (Rank II). It is difficult to maintain high productivity in family farming (Rank III). Major suggestions given by the farmers to improve family farming in descending order of rank were; (I) There should be a provision of government schemes for additional income generating activities related to family farming to improve living standard of the farmers. (II) The loss due to crop failure must be compensated by the government immediately. (III) There should be a provision of low rent land for cultivation under family farming.

SRL 32

Empowering rural mass through generation of cleaner energy and nutrient-rich biofertilizer

Vinit V. Modi[1], N. N. Desai[2], U. D. Dobariya[3]

[1] Ph.D. Research Scholar, ADIT, CVM, Gujarat

[2] and [3] Assistant Professor, CREEE, SDAU, S. K. Nagar

Email: vmmodee@gmail.com

ABSTRACT

India has an enormous amount of raw material available in the form of cattle dung. It is estimated that annually 1200 million tons of cattle dung is available in India, of which about 600 million tons surplus can be used as feedstock for biogas generation It means there is potential to generate 2,40,00000 cubic meters of row biogas every day. Cattle dung is considered to be one of the best raw materials in order to produce biogas. Raw biogas consists of 55-65% of methane and 30-40% carbon dioxide. The application of biogas is not just confined to domestic use but it can be now purified and used in vehicles as a fuel called bio CNG. The study was conducted on a 3500 cubic meter Biogas reactor for Bio-CNG cum Organic manure production, developed by Asia's largest Banas Dairy, Near Palanpur. Bio methanation, gas purification, compression and subsequent bottling for vehicular use and bio-fertilizer production system were the key areas of the case study. Bio-CNG is methane-rich gas (97-98%) with a minimal amount of impurities, thus, it makes it an ideal fuel to be used in vehicles. Bio-CNG gas has a high calorific value of about 52,000 KJ/kg at a lower price

compared to fossil fuels. The Banas dairy now started procuring fresh cattle dung from farmers to add extra income in addition to milk. The daily bio-CNG and manure production capacity of the unit is about 2000 cubic meters and 15 metric tons respectively. The unit produces vehicle-grade Bio-CNG and nutrient-rich biofertilizers to enhance the yield of crops.

SRL 33

Feasibility of Rabi crops using harvested rain water through MIS under semi arid conditions of North Gujarat

B. S. Parmar, N. I. Patel and C. K. Patel
Centre for Natural Resources Management, SDAU, Sardarkrushinagar
Email: parmarbs26@sdau.edu.in

ABSTRACT

The ponds prevailing in the history give ample evidence about the knowledge of man regarding harvesting and utilization of runoff water in rainfed areas. A field experiment was conducted to study the effect of treatments consists of three *Rabi* crops with low water requirement grown using harvested rainwater. The cc lined farm pond of 1100 m^3 capacity was used to harvest runoff water and results of crop performance obtained during 2019-20, 2020-21 and 2021-22 are presented. The harvested water was used for growing popular regional crops such as cumin, mustard and dilseed. Year wise cumin seed yield was obtained highest 410 kg/ha in the 2021-22 with mean seed yield of 377 kg/ha. The net profit of cumin cultivation (mean) was obtained ₹ 11917/ha with 1.28 BCR. Year wise mustard seed yield was obtained highest 1248 kg/ha in 2019-20 and mean seed yield of three years was obtained 1202 kg/ha. The net profit (mean) of mustard cultivation was obtained ₹ 20562/ha with 1.49 BCR. The mean seed yield of dilseed for three years was obtained 1265 kg/ha. The net profit of dilseed cultivation (mean) was obtained ₹ 40259 / ha with 2.03 BCR. The comparative performance of dilseed crop was found better over cumin and mustard in terms of water productivity and net return.

SRL 34

Indigenous practices used in control of various reproductive disorders

I. N. Bhabhor, B. H. Panchal and V. D. Rathva
Sheth D. M. Polytechnic in Horticulture, Model Farm, Vadodara
Email: ishwar.vet@gmail.com

ABSTRACT

Reproductive disorders are one of the major causes of poor productive performance in smallholder dairy farms. Among the major reproductive disorders that have a direct impact on economy of dairy farmers are abortion, dystocia, retained fetal membrane (RFM), pyometra, metritis, prolapse (uterine and vaginal), repeat breeder, anestrus. The indigenous technical knowledge (ITK) regarding animal husbandry is considered as old as domestication of various livestock species. There are practices related to anestrus from which Boiled guar and bajra ½ kg of each/day fed to animal for one week (ranked I), Boiled methi grain 1kg/day fed to animal empty stomach for 5 days (ranked II), Bajara grain 1 kg/day and jiggery ½ kg/day for 10-15 days (ranked III). Practices related to retention of plecenta from which Tightly tie rope on horn in the shape of digit 8 (ranked I), Keep animal in standing position till expel placenta (ranked II), Sugar ½ kg and 1 kg colostrum after 3-5 hours of calving (ranked III). Practices related to retention of plecenta from which Tightly tie rope on horn in the shape of digit 8 (ranked I), Keep animal in standing position till expel placenta (ranked II), Sugar ½ kg and 1 kg colostrum after 3-5 hours of calving (ranked III), Avoid milking of colostrum after calving till expel placenta(ranked IV), Naval of animal is smear with oil/ghee and warm for few minutes (ranked V), Dreanch 1-2 lit sugar solution (ranked VI), Ash 250g dissolve in luck warm water and offer to animal (ranked VII), Fed methi grain ½ kg and ½ kg jiggery (ranked VIII).

SRL 35

Indigenous practices for weather forecasting in agriculture

Vani Chandran[1], Subhash Kumar Saurav[2] and Elizabeth Jose[3]

[1] Assistant Professor, Department of Agricultural Extension Education, College of Agriculture, Padannakkad, Kerala Agricultural University, Kerala

[2] Ph.D. Research Scholar, Division of Agricultural Extension, ICAR-IARI, New Delhi

[3] Faculty, Agricultural Extension, Malla Reddy University, Maisamagauda, Hyderabad

ABSTRACT

Out of the various factors which control agricultural production, weather is the only factor over which man has no control hence it has an overwhelming dominance over the success or failure of agricultural enterprises. To limit the risk associated with crop failures owing to weather fluctuations, it should be considered as one of the key elements in agricultural planning. As a result, forecasting weather characteristics is critical in agriculture systems for ensuring sustainable production. Indian farmers, over centuries, have learnt to grow food and to survive in difficult environments, where the rich tradition of Indigenous Traditional Knowledge (ITK) has been interwoven with the agricultural practices followed by them. ITK is a functional knowledge system rooted in a community that has been built, preserved and refined by generations of people through constant interaction, observation and exploring with their surrounding environment. Traditionally, farmers in India have followed their own ways to predict rainfall, relying on knowledge that has evolved through their experiences and observations over a period of time. They usually determine the weather forecast based on the stars or moon position, or movements of fauna and the condition of flora. Scientific forecasts have its own benefits in the modern world. At the same time traditional knowledge has the potential of being translated into commercial benefits by offering clues or hints for the creation of beneficial practices and methods for the betterment of humanity. The different strengths of these two systems, when merged, offer farmers more valuable information than either system can provide in isolation. So systematic documentation and subsequent integration of indigenous knowledge in weather forecasting is one of the promising initiatives that need to be explored.

SRL 36

Level of knowledge of dairy farmers about deworming and vaccination in buffalo

Rathavi Bhavesh, Patel, Mahesh. R. and Vijay B. Patel

Anand Agricultural University, Anand

Email: Pankaj56402@gmail.com

ABSTRACT

Knowledge is a body of understood information possessed by an individual or by a culture. It is one of the key components of behaviour and as such holds an important role in the covert and overt behaviour of an individual. It is necessary to know the fact that up to what extent farmer's had the knowledge about deworming and vaccination in buffalo. This study was conducted in Anand district of Gujarat. Sample size of the present study was 100 dairy farmers doing deworming and vaccination in buffalo. The result of study revealed that nearly half (48.00 %) of the dairy farmers had a medium level of knowledge, followed by 21.00 per cent and 19.00 per cent who had low and high level of knowledge, respectively. Only 10.00 per cent and 02.00 per cent of the dairy farmers were found with very high and very low level of knowledge regarding deworming and vaccination, respectively. It can be thus inferred that majority (67.00 %) of the dairy farmers had medium to high level of knowledge regarding deworming and vaccination. It means that majority of the dairy farmers were well aware about the importance of better animal healthcare practices.

SRL 37

Performance evaluation of effluent treatment plant for generating irrigation water and biogas fuel

Vinit V. Modi[1], D. B. Patel[2], U. D. Dobariya[3]

[1] Ph.D. Research Scholar, ADIT, CVM, Gujarat

[2] Professor & Head, Department of Agril. Extension & Communication, CPCA, SDAU

[3] Assistant Professor, CREEE, SDAU, S. K. Nagar

Email: vmmodee@gmail.com

ABSTRACT

This paper analyzes the latest wastewater treatment techniques used at Banas, Asia's largest milk processing cooperative conglomerate, for irrigation and biogas production from sludge. The freshwater usage for various stages of milk processing in the dairy was usually 50-60 lac litre per day. Water is a precious resource and the impact of wastewater on the environment should not be overlooked. The wastewater produced at the end of milk processing is known as effluent. It is organic in nature and does not contain any toxic elements or heavy metals. Banas Dairy established a 4500 cubic meter/day capacity Effluent Treatment Plant (ETP) in order to treat wastewater for irrigation purposes and to produce 1400 cubic meters of biogas fuel. Effluent treatment plant yields a significant reduction in Total Dissolved Solid (TDS), Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD) and Oil &Grease of dairy wastewater, which makes it suitable, use for irrigational purposes. Sludge produced in all sections of the ETP were evaluated for their potential to treat waste water as per the standard set by the Central Pollution Control Board (CPCB). The paper emphasizes on properties of wastewater, its treatment steps and the final quality to suit irrigation water.TDS, TSS, COD, BOD and oil & grease in treated water were found to be reduced to about 30 per cent, 90 per cent, 97 per cent, 98 per cent and 94 per cent respectively when compared with the values of wastewater at the inlet of ETP.

SRL 38

Performance evaluation of solar-biomass hybrid drying system for turmeric drying

Ajinkya Deshpande[1], N. N. Desai[2], V. M. Modi[3] and U. D. Dobariya[4]

[1] and [4] Assistant Professor, Dept. of Renewable Energy, CREEE, SDAU, S. K. Nagar

[2] Assistant Professor & Head, Dept. of Agricultural Engineering, CREEE, SDAU

[3] Associate Professor & Head, Dept. of Renewable Energy, CREEE, SDAU, S. K. Nagar

ABSTRACT

The performance evaluation of solar-biomass and hybrid drying system for turmeric drying was carried out. The turmeric slices drying during the month of January. The result showed that drying of turmeric slices took one day on an average insolation rate of 1158 W/m². The temperature inside the dryer was higher near to heat exchanger and decreased as tray placed far away from heat exchanger. The thermal inertia of solar-biomass hybrid dryer was broken within 1.250 hrs. The full load performance was carried out with the same loading rate i.e. 67.42 kg per batch and dryer had 24 trays each tray containing 2.760 kg turmeric slice. The drying operation batch was completed in 8 hrs in day. The maximum temperature achieved inside the dryer was 55°C at 10 % relative humidity and 1158 W/m^2 solar insolation. For drying of turmeric slices, initial moisture content 71.41% (w.b) and operation were stop at 0.2% (w.b.) moisture content. The maximum turmeric drying rate in solar-biomass hybrid drying system was observed 0.150 kg/hr at 13.00 hrs. The maximum drying efficiency of turmeric slice in solar-biomass hybrid drying system was recorded as 37.03%.

SRL 39

Role of organic amendments on incidence of termites in groundnut

M. K. Kanani[1], A. L. Gohil[2] and P. K. Borad[3]

[1] Assistant Research Scientist, Agri. Res. station, JAU, Amreli

[2] Deputy Project Director, ATMA, Bhavnagar

[3] Rtd. Professor and Head, Department of Agril. Entomology, AAU, Anand

Email: mkkanani@jau.in

ABSTRACT

Field experiment was conducted at Agronomy farm, B. A. College of Agriculture, Anand Agricultural University, Anand. We tested different nine organic amendments *viz.* FYM, vermicompost, neem cake, castor cake, mahuva cake, cotton cake, tobacco dust, maize cake and poultry manure along with the control. The soil application of neem cake, castor cake and vermicompost @ 1 tonne/ha at the time of land preparation before sowing were found to be more effective in suppressing the termites incidence in groundnut during *summer* and *kharif* seasons. These treatments produced higher (1878 to 2283 kg/ha) pod and haulm (3967 to 4282 kg/ha) yield during *summer* as well as in *kharif* season (2141 to 2411 kg/ha pod and (3693 to 4227 kg/ha) haulm). Increased in yield over control was 39.88 to 50.55 per cent of pod and 47 to 51.33 per cent of haulm in *summer*, whereas it was 48.80 to 54.54 per cent of pod and 46.62 to 52.99 per cent of haulm in *kharif* season. The loss in pod was up to 7.22 per cent and in haulm was up to 3.48 per cent in *summer,* while in *kharif* it was 7.80 per cent of pod and 7.04 per cent of haulm.

SRL 40

Solar-powered winnower for resource use efficiency and sustainable agricultural development

V. M. Modi[1], Alok Gora[2] and N. N. Desai[3]

[1] Principal & Dean, CREEE, SDAU, S. K. Nagar

[2] Professor & Head, C. P. College of Agriculture, SDAU, S. K. Nagar

[3] Assistant Professor, CREEE, SDAU, S. K. Nagar

Email: vmmodee@gmail.com

ABSTRACT

Winnowing is an age-old agricultural practice that involves separating grain from impurities such as chaff, straw, and husk. The traditional method of using shovels and a sieve to allow the dried grains to fall from a height is time-consuming, uncomfortable, and requires significant manual labour. This approach can quickly tire out labourers, and wind availability can also pose limitations on traditional winnowing operations. Photovoltaic systems are now affordable, low-maintenance, and have lower operating costs compared to traditional electrical power systems. A solar photovoltaic powered winnower was developed and evaluated at the College of Renewable Energy and Environmental Engineering, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. The bulk density of wheat and pearl millet were found to be 770 kg/m^3 and 825 kg/m^3, respectively, with an average angle of repose of 34.25 and 27.35 degrees. The performance evaluation of the winnower was conducted at different feed rates for wheat and pearl millet crops. The feed rates for wheat were 110 kg/h, 130 kg/h, 150 kg/h, 170 kg/h, and 190 kg/h, while for pearl millet, they were 480 kg/h, 520 kg/h, 560 kg/h, 600 kg/h, and 640 kg/h. 110 kg/h feed rate was found to be the most suitable for wheat as it resulted in the highest cleaning efficiency of 95.86%, with the lowest grain loss of 0.36% and operating cost of 0.83 ₹/kg. After conducting various tests for pearl millet, it was determined that a feed rate of 480 kg/h was the most suitable. This rate resulted in the best cleaning efficiency of 96.17%, the lowest blow of grain at 0.67% and the lowest operating cost at 0.19 ₹/kg. The total cost of the Solar Powered Winnower was ₹ 56515.

SRL 41

Drying of rose petals using renewable sources of energy

Piyush Verma, N. N. Desai, V. M. Modi and Vishal Vankhede
Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar
Email: narsinh67@gmail.com

ABSTRACT

The process of drying is crucial in preserving agricultural products. Different methods are used depending on the type of crop being dried. Each technique has its advantages and disadvantages. Therefore, it is important to select the appropriate drying system for each agricultural product to achieve optimal results. Desi rose petals have very pleasant fragrance, various value-added products such as syrup, sharbat, gulkand, rose oil, rose water, etc. can be prepared from it. Additionally, it also possesses immense medicinal properties. The shelf life of desi rose flowers is very short and early petal shading is the limiting factor in their marketing and utilization. Therefore, drying of rose petals is of much more importance for using them in value-added products. An experimental study was performed to determine the drying characteristics of rose petal by using Greenhouse Dryer (D_1), Indirect Type Natural Convection Solar Dryer (D_2), Direct Type Natural Convection Solar Dryer (D_3), Open Sun drying (D_4) and Room drying (D_5). Results revealed that effect of environment, drying methods and their interaction significantly influenced the time taken for drying of rose petals. Among the drying methods, least time was taken by D_3 (Direct type natural convection solar dryer) method where 97.50 min., 102.50 min. and 100.00 min. were taken during 2018, 2019 and in pooled, which was significantly differed over all other methods. The better retention of colour of rose petals was found in D_2 (Indirect type natural convection solar dryer) and D_1 (Greenhouse dryer) method with 7.65 and 7.53 respectively on hedonic scale value in pooled analysis. From the foregoing discussion, it is clear that to dry the rose petals, Indirect type natural convection solar dryer or Greenhouse dryer are to be used as the colour retention of dried petals is maximum and acceptable.

SRL 42

Techno-economic feasibility of solar water pumping system for empowering rural mass through generation of cleaner energy

V. M. Modi[1], N. N. Desai[2] and Vinit Modi[3]
[1] Principal & Dean, [2] Assistant Professor CREEE, SDAU, S. K. Nagar
[3] Ph. D. Research Scholar, ADIT, CVM, Gujarat
Email: vmmodee@gmail.com

ABSTRACT

North Gujarat region is predominantly known for agro based economy. As surface water sources are very much limited in these regions, irrigation mainly depends upon underground water strata available at different water table. Close to 80% of the total irrigated area is dominated by deep and shallow tube wells while canal water covers hardly 20%. Gujarat ranked fourth in terms of energization of pump sets over the past three decades, showing more than fivefold increase in the number of pump sets from 2.62 Lakhs during 1983 to 14.28 Lakhs during 2017. Solar photovoltaic (PV) pumps are powered by an array of solar panels. Solar PV pumps are designed to operate on DC power produced by solar panels, or on existing AC pump with inverter. Solar pumps are easy to install and are generally "good" for the sustainability of boreholes due to their low extraction volumes spread over eight to ten hours a day. To cope up the ever increasing demand, the Gujarat government has provided solar-powered water pumps to farmers to reduce the burden on existing power plants and encourage the farmers to opt for solar powered pumps for their regular irrigation needs. A study on techno economic feasibility of solar water pumping system at farmers fields was carried out during 2015 and 2016 in the North Gujarat region. The study recommended the farmers to adopt 5 hp solar

photovoltaic water pumping system coupled with micro irrigation system to promote eco-friendly daytime irrigation. The North Gujarat region is endowed by abundant solar radiation for 300-315 days with insolation of 4.5-6.5 kWh/m^2/day. The system is found quite appropriate in the total head range of 5-85 m. Life cycle cost (LCC) of PV system was found to be 58.5% less compared with diesel pump set, average payback period was found to be about 4 years.

SRL 43

Perception of agricultural students towards natural farming

Ganvit Tanvi D. and Hemlata Saini
Department of Agricultural Extension and Communication, BACA, AAU, Anand
Email: tanviganvit13@gmail.com

ABSTRACT

This research investigated perception of agricultural students towards natural farming. The study was conducted in Gujarat Agricultural University, Gujarat. The study explores with specific objectives such as studying the profile of agricultural students, assessing the perception of agricultural students towards natural farming, ascertaining the relationship between profile of the students and perceptions of agricultural students towards natural farming, eliciting constraints and offering suggestions for natural farming. The ex-post facto research design and simple random sampling technique were used in the research. Total 60 respondents were selected for the study. The data was primarily collected based on questionnaires in Google form. The data collected were analyzed using frequency counts, percentages and correlation analysis. Based on the findings of the study, it can be concluded that majority (53.33 %) of the respondents belonged to 22 age group, 57.60 per cent respondents were male students, 61.67 per cents respondents were interested in job and 65.00 per cent respondents had rural habitation. The study also revealed that majority of students believe that natural farming is beneficial for the environment, reduces the usage of harmful chemicals, and improves the health of the soil. They also appreciate the taste and quality of the produce from natural farming. The major constraints expressed were Lack of market access (81.67 %), Lack of proper knowledge and exposure (75 %), laborious nature of Natural farming (70 %), etc. Suggestions like Building collaboration and networks (91.67 %), Providing proper lectures to the students (51%), Giving wide publicity on the benefits of natural farming (78.33%), etc. Education and awareness initiatives can play a vital role in promoting natural farming and encouraging more students to support this sustainable agricultural practice. Hence, efforts are needed to provide proper information and clarity regarding the concept of natural farming to the students.

SRL 44

Farm machineries for organic farming

P. S. Jayswal[1] and K. N. Sondarva[2]
[1]Krishi Vigyan Kendra, JAU, Amreli
[2]College of Agril. Engg. and Tech., NAU, Dediapada
Email: priti.jayswal@jau.in

ABSTRACT

Power is the key to perform each and every work in every field whether it is traditional agriculture or organic farming or natural farming. As compare to traditional agricultural practices organic farming and cow based farming system uses less mechanization on farm. This research paper deals with the areas where farmers may use tools or equipments for organic farming or cow based farming. The results of the research was found out that farmers may use seed dressing drums, man power operated decorticators, small weeders, drip irrigation etc. on their field to perform organic farming.

SRL 45

Effect of different intercropping systems on growth and yield characters of jasmine

Trupti Dodiya[1], G. D. Patel[2] and S. K. Bhuva[3]

[1]Assistant Professor, College of Agriculture, JAU, Mota Bhandariya (Amreli)

[2]Assistant Professor, ACHF, NAU, Navsari

[3]Assistant Professor, College of Agriculture, JAU, Junagadh

Email: truptidodiya@jau.in

ABSTRACT

A field experiment was conducted at Floriculture Research Farm, Navsari Agricultural University, Navsari to study the effect of different intercropping systems on growth and yield characters in jasmine. The experiment was carried out in randomized block design with two intercropping seasons which consisted of ten treatments replicated thrice. The treatment consisted growing of annual flowers as intercrops viz., African marigold, French marigold and Gaillardia with different ratios. Sole jasmine without any intercrops treated as control. The various growth and yield parameters of jasmine were recorded and statistically analyzed. Consistent increase in plant density showed significant results in all the parameters. Maximum yield was obtained from T7 (sole jasmine) (124.79 g/plant, 1.94 kg/plot and 0.84 t/ha) which was statistically at par with T1 (Jasmine + African marigold 1:1), T3 (Jasmine + French marigold 1:1) and T4 (Jasmine + French marigold 1:2).

SRL 46

Empowering rural community: Adoption and impact of renewable energy products

Foram Joshi, Serene Shekhar and Tejasveeta Bavishi

ASPEE College of Nutrition and Community Science, SDAU

ABSTRACT

Exploring the adoption and impact of renewable energy products in rural communities, this study conducts a thorough review of existing literature to provide insight into the transformative influence of integrating renewable energy technologies. The examination centers on understanding how these technologies are shaping the socio-economic fabric of rural areas. Highlighting the pivotal role of renewable energy adoption, the study delves into addressing energy poverty and enhancing the overall quality of life for rural residents. Economic implications, including job creation, income generation, and community development, are scrutinized to comprehend the multifaceted impact of integrating renewable energy solutions. Environmental considerations play a crucial role in the analysis, examining the shift away from traditional, environmentally harmful energy sources to mitigate climate change and promote ecological sustainability. The study also evaluates social aspects, emphasizing improved access to education and healthcare, with a specific focus on empowering marginalized groups within rural communities. By emphasizing the intricate relationship between renewable energy adoption and rural development, the research underscores the importance of sustainable and informed decision-making to address the evolving energy needs of rural areas.

SRL 47

Fertigation in pomegranate in semi arid region of North Gujarat

B. S. Parmar, J. J. Makwana, A. K. Saini and C. K. Patel
S. D. Agricultural University, Sardarkrushinagar
Email: parmarbs26@sdau.edu.in

ABSTRACT

A field experiment was conducted to study the effect of treatments consists of four levels of irrigation i.e. 0.6PEF, 0.8PEF, 1.0 PEF through drip alternate day and 1.0 IW/CPE, 50 mm depth surface irrigation (control) along with three levels of nitrogen i.e. 75%, 100% and 125 % of RDF (625-250 -250 gm/plant) NPK as fertigation were tested for five year in loamy sand soil of semi arid conditions of North Gujarat on pomegranate variety Bhagwa. Among the irrigation treatments, crop irrigated at I_3 (1.0 PEF drip) recorded significantly higher fruit yield of pomegranate during all the years but were found non- significant in pooled results. The effect of fertilizer was found non–significant in all individual years except 2017-18 but, were found significant in pooled results. The fruit yield was recorded significantly higher (8.434 kg/plant) in treatment F_3 (125% RDF) but remained at par with treatment F_2 (control: 100% RDF). The higher TSS was recorded in treatment F_2 (100% RDF) but remained at par with treatment F_3 (125% RDF) in pooled results. The plant girth was found significantly higher in treatment F_3 (125% RDF) but remained at par with treatment F_2 (100% RDF) in pooled results. The water use efficiency was found higher in drip irrigation treatments over surface irrigation treatment I_4 . The higher water use efficiency of 6.71 kg/ha-mm was obtained in I_1 treatment (0.6 PEF drip) followed by I_2 (0.8 PEF drip) and I_3 (1.0 PEF drip). The water saving over control was observed highest (41%) in treatment I_1 over control I_4.

SRL 48

Farm ponds: A climate smart solution for rainfed agriculture

Y. B. Vala[1], S. H. Malve[2] and C. K. Patel[3]
[1] and [2]Krushi Vigyan Kendra, S.D.A.U., Banaskantha-I
[3]Associate Director of Research, Directorate of Research, SDAU, Sardarkrushinagar
E-mail : yashrajsinhvalaagri8877@gmail.com

ABSTRACT

Rainfed agriculture constitutes 55% of net sown area in the country. Rainfall is a basic resource for all the forms of water in semi-arid tropics of India. India uses 80% of the available water in agriculture keeping the remaining 20% for drinking, industry and energy sectors. The growing population puts tremendous pressure on the water resources. Water harvesting is one of the key components of successful rainfed farming in semi-arid regions. Harvesting surplus runoff in dug out ponds and recycling the same for providing supplemental irrigation to *kharif* crops or pre-sowing irrigation to rabi crops has proved to be the most successful technologies for adoption. It is one of the most important rain water harvesting structures constructed at the lowest portion of the farm area. The stored water must be used for irrigation only. For recharging the ground water, the structures require high capacity and are generally located in the soils having high infiltration rates and are called percolation tanks. Under NICRA project by KVK, Banaskantha-I, natural resource management awareness and interventions carried out from 2015-16 to address to issue water scarcity. Water scarcity is one of the biggest issues in dhaneri village, Dantiwada Taluka of Banasknatha district. Cultivation of *rabi* and summer crops is totally depends on how much rainfall received, moisture conserved during *kharif* season and water level in bore well. In the year 2021-22, farm pond of 100 X 50 X 40 ft size having capacity of 6000 cu. meter capacity digged out in that village farm and lining with black color plastic sheet. On an average village having 380-496 feet ground water level and level goes down to 510-560 feet under drought situation.

Gender Sensitive Agriculture and Women Empowerment (GSA)

GSA 1

Association between women's food literacy and food security

Shraddha R. Kapadiya
Senior Research Assistant, Potato Research Station, Deesa, Sardarkrushinagar Dantiwada Agricultural University, B.K. Gujarat
E-mail : shraddharkapadiya@gmail.com

ABSTRACT

Poor food literacy behaviours contribute to food insecurity in developed countries. A person's capacity to feed herself (and others) in a manner that promotes nutrition is influenced by their level of food literacy. Food security and food literacy have a bidirectional relationship in which food insecurity can limit one's ability to apply food literacy practises to obtain an appropriate diet quality and insufficient food literacy can contribute to food insecurity. Food literacy is a quality that can be improved by education and skill development. But it is impossible to overstate the contribution of women to the numerous facets of food security. As food producers, farmers, and business owners; as 'gatekeepers' who invest time and money and make crucial decisions that ensure the food and nutrition security of their households and communities; and as entrepreneurs, women play a crucial role in sustaining the four dimensions of food security (availability, access, utilisation, and stability). Food literacy is seen as a necessary life skill that represents individual practises for organising, choosing, preparing, and consuming healthy foods. Food literacy is thought to improve aspects of food insecurity as improved knowledge and skills may assist to maximise income, but only to a certain point as education cannot change the cost of food or resolve other food insecurity causes that are economic in nature. Yet, there is minimal published evidence on the impact of nutrition education and food literacy. Therefore, there is a need to explore the relationship between food literacy and food security. This is a review based study in which online published articles were examined. The findings drown deepens our knowledge of the relationship between food security and food literacy.

GSA 2

Role of anganwadi worker in food and nutritional security

Rabari Mittal[1], Serene Shekhar[2] and Tejasveeta Bavishi[3]
[1]M.Sc. Student, [2]Assistant Professor, [3]Ph. D. Scholar
ASPEE College of Nutrition and Community Science, SDAU
E-mail : tejubavishi26@gmail.com

ABSTRACT

Poshan Abhiyan (National Nutrition Mission) is India's flagship programme, launched in March 2018 to improve the nutritional status of up to six-year-old adolescent girls, pregnant women and lactating mothers to achieve specific targets for reduction in low birth weight babies. Thus, the present study was proposed to investigate the "Role of Anganwadi Worker in Food and nutritional security" about nutritional aspects of Poshan Maah 2018-2020." The present study was conducted in Banaskantha district, Gujarat state. A representative sample of 120 respondents was taken. Awareness levels for nutritional aspects of Poshan Maah of Anganwadi workers were studied as a dependent variable. The findings revealed that a maximum of 70.83 per cent of the respondents had a medium level of awareness regarding the overall awareness level of Poshan Maah. ANOVA for critical differences in the awareness level of various aspects of Poshan Maah was found to be highly significant. The 'Hygiene and Sanitation' aspect ranked first among awareness levels about nutritional aspects of Poshan Maah. Awareness of dietary factors is positively and significantly associated with education and mass media exposure. Age and caste were found to be non-significant, with an awareness level of various aspects of Poshan Maah 2018-2020. Thus, it can be said that with an increase in the education of anganwadi workers and wide publicity about varied elements of Poshan Maah through mass media, they will be more aware. Therefore, the same could be disseminated to the beneficiaries.

GSA 3

Entrepreneurial constraints of shg women members: A rapid review

Bhawana Asnani
Assistant Professor
Office of the Director Students' Welfare, Junagadh Agricultural University, Junagadh
E-mail: bhawana_asnani@yahoo.com

ABSTRACT

A SHG is an appropriate credit delivery mechanism for the poor. Microfinance is a source of financial services for those entrepreneurs and business which lack financing opportunities from the market. The objective of such lending was that by lending to groups of women where every member of the group guarantied the repayment of all members, it would prove the poor people credit worthy. Engagement of women in economic activities can create problematic situations at home, office or in the society. The Government of few states have taken up the theme of women empowerment as one of the strategies to tackle the socioeconomic poverty and self-help movement through savings has been taken up as a mass movement by women–a path chosen by them to shape their destiny. The choice of SHG members was limited to a few activities because the amount of loan was small in the initial years of the linkage programme concerned. Infrastructural, technical and financial constraints ranked first, second and third respectively by literate and illiterate members of self-help group. Participation of women in gainful activities was less & controlled by social and cultural conditions. Micro-financing may be increasing women workload and responsibility without enhancing their control over income and expenditure. Therefore, training in different economic activities to impart skills, providing other assistance through governmental and non-governmental agencies may be useful to start income generating activities and stand on their own.

GSA 4

Determinants of perception of professional woman faculties about their working environment

Meenu Maheswaran[1] and R. D. Pandya[2]
[1]Assistant Professor, College of Agriculture, Padannakadu, Kerala Agricultural University [2]Retd. Principal and Dean, NMCA, Navsari Agricultural University, Navsari, Gujarat
E-mail : meenumaheswaran62@gmail.com

ABSTRACT

Several determinants profoundly affect the perception of professional woman's faculties about their working environment. In the present study, those factors that decisively affect the nature of perception of woman's faculties about their working environment were identified using path analysis and stepwise regression analysis. Direct and indirect effects of profile characteristics of professional woman faculties on their perception of the working environment can be well known from path analysis. Stepwise regression analysis was used to predict the extent of variation in perception caused by the independent variables. The study was conducted among hundred-woman faculties working in four state agricultural universities of Gujarat state: NAU, Navsari, JAU, Junagadh, AAU, Anand and SDAU, Dantiwada. The path analysis results indicated that management efficiency (0.253) had exerted maximum direct positive effect and professional performance (0.250) had exerted the highest positive total indirect effect on the perception of professional woman faculties about the working environment. In maximum substantial indirect effect on perception, annual income routed maximum times. From the stepwise regression analysis, it was understood that four independent variables such as job satisfaction (0.302*), management efficiency (0.275*), group cohesiveness (0.727*) and infrastructural facilities (0.435*), were the four variables which together accounted 21.40 per cent variation as indicated by adjusted R^2 value for the perception of professional woman faculties about working environment.

GSA 5

A story of a national awardees dairy woman

V. K. Patel, P. B. Singh and C. K. Desai
Krushi Vigyan Kendra, Tharad
Sardarkrushinagar Dantiwada Agricultural University
E-mail : drvikrampatel2012@gmail.com

ABSTRACT

Smt. Moghiben Vardhsinh Rajput, district Banaskantha sets, is the best example of dairy farming. Being still illiterate, she has achieved success in the animal husbandry field. She has a managed dairy farm with the best quality indigenous breed of Kankrej cow, Mehsana and Bunny buffalo. She has established basic facilities like a shed, drainage, water, feed, and storage room in the dairy farm. She has adopted scientifically recommended management practices of housing, feeding, breeding and health of animals. KVK scientists frequently visit her farm and provide scientific input, and they have demonstrated several advanced technologies in dairy farming. She has been honoured with many awards and got recognition and appreciation from the animal husbandry department, district cooperative dairy, state agricultural university, NGO, etc., for her marvellous work in dairy farming. She won the 'Gopal Ratna Award' in 2021, the highest national award in the livestock and dairy sector. She is truly a role model for other rural dairy farm women in the district.

GSA 6

Extent of participation of farmwomen in agricultural development and family welfare

N. B. Thakur[1] and J. B. Patel[2]
[1]Research Associate, Extension Education Institute, AAU Campus, Anand
[2]Associate Professor, BACA, AAU, Anand
Email: nidhi.thakur2794@gmail.com

ABSTRACT

This present study was conducted with a sample of 200 respondents. Ex-post facto research design was used for the research study. The study was carried out in Vadodara district of Gujarat. On the basis of higher cotton production four Talukas were *viz*, Karjan, Dabhoi, Sinor and Padara were selected. The study was conducted to know extent of participation of farm women in agricultural development and family welfare. The findings suggest that nearly two-fifth (39.00 %) of farm women had high participation index followed by medium participation index (35.00 %) and low participation index (26.00 %). Major aspect were crop production with 79.76 mean score ranked 1st in participation of farm women followed by animal husbandry and dairy management (45.14 mean score ranked 2nd), household management (31.60 mean score ranked 3rd), freedom to go outside (15.34 mean score ranked 4th) and economic aspects (11.70 mean score ranked 5th) in participation of farm women in family welfare and agricultural development.

GSA 7

Extent of participation of women in decision making related to dairy farming

S. J. Vekariya[1], Durgga Rani[2] and M. B. Rajput[3]

[1]Assistant Professor and [2]Veterinary Officer

Kamdhenu University, Gandhinagar

E-mail: sjvekariya@kamdhenuuni.edu.in

ABSTRACT

India has a predominantly agrarian economy and livestock sector is an integral component of it where, livestock production is largely in the hands of women. Dairy sector plays an important role in strengthening country's rural economy. It has the potential to act as an instrument to bring socio-economic change among dairy farmers. The present study was carried out in Gandhinagar district of the Gujarat state. All the four talukas were selected for the present study. From each selected taluka, five villages with higher milk production were selected purposively. The women dairy farmers having minimum five milch animals at home, from each of the identified villages was selected randomly in such a manner that their number would be proportional to total number of dairy farm women in respective village milk producer's co-operative society under each taluka. In all, 250 dairy farm women were selected for the study. The data was collected through personal interview schedule. Collected data was compiled, tabulated and analyzed using appropriate statistical tools and techniques. The result reveals that women dairy farmers had an overall decision making in dairy farming were 54.57 per cent. The women dairy farmers had largest decision making (69.72 %) in the management aspects followed by processing and marketing (65.32 %), breeding aspects of dairy animals (57.60 %), feeding of dairy animals (51.13 %) and health care aspect of dairy animals (44.20 %). Least decision making (39.42 %) was observed in general aspects of dairy farming.

GSA 8

Exploring the joining motives and influence of entrepreneurial activities on the livelihood of woman members of SHGs in Chhotaudepur district of Gujarat

Y. H. Rathwa[1], S. R. Patel[2] and P. H. Vihariya[3]

[1]Senior Research Fellow, [3]Research Associate, Extension Education Institute, Anand, Gujarat

[2] Principal, College of Agriculture, Anand Agricultural University, Jabugam, Gujarat

Email: yogeshrathva00@gmail.com

ABSTRACT

The present study was conducted in the Chhotaudepur district of Gujarat state, composed of six talukas. All the talukas were selected for the study, and 180 woman members of self-help groups (SHGs) were recruited as respondents. The research design employed was ex-post facto, and the aim was to examine the motives to join and the impact of entrepreneurial activities on the livelihoods of women members of SHGs. The results were presented in tabular form, and the data was ranked based on its mean scores. The findings showed that the major motive is to get supplement income, and the major influences of entrepreneurial activities on the livelihoods of female members of SHGs were as follows: firstly, economic security was ranked first; secondly, the overall standard of living had improved after joining the SHG rank of 2nd; thirdly, self-independence had increased after joining the SHG. It was observed that slightly over three-fifths (61.65 per cent) of the woman members of SHGs had a medium to high level of influence of entrepreneurial activities on their livelihood.

GSA 9

From farm to table: Women's impact on india's food security

Anjali S. Chaudhari,[1] Khushboo Bhati[2] and Patel Umang[3]

[1] and [3]Ph. D. Scholar, Department of Agricultural Economics, N.M.C.A., N.A.U., Navsari

[2]Ph. D. Scholar, Department of Agril. Extension & Comm., N.M.C.A., N.A.U., Navsari

E-mail: achaudhari1302@gmail.com

ABSTRACT

Women play a multifaceted and indispensable role in ensuring food security, serving as key contributors to various facets of the food system in India. They are not only primary producers but also crucial in processing, distribution and nutrition within households. In rural India, women are often responsible for cultivating and harvesting crops, tending to livestock and managing small-scale fisheries, thereby forming the backbone of agricultural production. Additionally, women are integral in post-harvest activities such as food preservation, processing and storage, which are critical for minimizing food losses and ensuring a stable food supply. In households, women are typically the primary decision-makers when it comes to food choices and nutrition, playing a vital role in ensuring that family members have access to a balanced and diverse diet. Furthermore, women's empowerment and access to resources are central to improving food security as it leads to increased agricultural productivity and income, ultimately benefiting entire communities. In sum, the abstract role of women in food security encompasses their pivotal contributions throughout the food production and distribution chain, as well as their influence on household nutrition and overall community well-being. Recognizing and supporting these roles is essential for achieving sustainable food security worldwide.

GSA 10

Factors associated with professional woman faculties regarding working environment of SAUs, Gujarat

Meenu Maheswaran[1] and R. D. Pandya[2]

[1] Assistant Professor, College of Agriculture, Padannakadu, Kerala Agricultural University

[2] Retd. Principal and Dean, NMCA, Navsari Agricultural University, Navsari, Gujarat

E-mail : meenumaheswaran62@gmail.com

ABSTRACT

Several factors play vital roles in influencing the professional life of woman faculties to advance their roles and functions within agricultural universities as teacher/researchers/extensionists. The woman faculty identifies those factors that restrict and enhance them personally, professionally and organizationally. The study was conducted among a hundred female faculty members working in four state agricultural universities of Gujarat state: Navsari Agricultural University, Junagadh Agricultural University, Anand Agricultural University and Sardar Krushinagar Dantiwada Agricultural University. All five categories of factors were identified, *viz.*, eight social, seven physical, eight psychological, six economical and seven organizational factors for measuring this variable. The majority of the women faculties chose work-life balance (MS 2.93) as the important social factor, teacher-student ratio (MS 2.77) as the relevant physical factor and self-confidence (MS 2.81) was considered as the important psychological factor, monetary rewards for achievements (MS 2.67) as the relevant economic factor associated with the working environment.

GSA 11

Gender mainstreaming in agriculture and allied sectors

Khushboo Bhati[1] and Chaudhari Anjali S[2]

[1]Research Associate, IRMA, Anand, [2]Ph.D. Scholar, N.A.U., Navsari

ABSTRACT

The agriculture sector employs 80.00 per cent of all economically active women; they comprise 33.00 per cent of the agricultural labour force and 48.00 per cent of self-employed farmers. Women play a significant and crucial role in agricultural development, including crop production, livestock production, horticulture, postharvest operations, agro/social forestry, fishing, etc. National Policy on Farmers, 2007, has included mainstreaming the human and gender dimensions in all farm policies and programmes as one of the primary policy goals. Gender mainstreaming was first introduced at the 1985 Nairobi World Conference on Women. It was established as a strategy in international gender equality policy through the Beijing Platform for Action, adopted at the 1995 Fourth United Nations World Conference on Women in Beijing, and subsequently adopted as a tool to promote gender equality at all levels. In 1998, the *Council of Europe* defined gender mainstreaming as "The (re) organization, improvement, development and evaluation of policy processes, so that a gender equality perspective is incorporated in all policies at all levels and at all stages, by the actors normally involved in policy-making." Realizing the present feminized agriculture scenario, women farmer's contribution to agriculture and understanding that it is gender that differentiates the roles, responsibilities, resources, constraints and opportunities of women and men in agriculture, precise gender information is the need of the hour. Incorporating gender into agricultural development requires articulating gender perspectives in development activities. This may improve farm women's access to productive resources, including agricultural extension services, thereby improving the lives of rural women. This may not only enhance the production and productivity of the farming sector and improve overall national food security but also smoothen the transition of women from being beneficiaries of programmes & schemes to actively participating in shaping the agenda.

GSA 12

Women leadership for agricultural development: Factors segregative to male leaders

Patil S. S.[1], Kanani P. R.[2] and Jadav N. B.[3]

[1]Senior Research Assistant, RCSM, College of Agriculture, Kolhapur (Maharashtra)

[2]Former Head of the Department, Department of Extension Education, JAU, Junagadh

[3]Head of the Department, Department of Extension Education, JAU, Junagadh

E-mail : hiradeep183@rediffmail.com

ABSTRACT

The 73rd amendment in 1992 in Constitution of India, made establishment of Panchayats mandatory and also provides the political space to the disadvantage section of the society like schedule caste, schedule tribes and particularly women. This study was done to examine the relative importance of different factors in differentiating the male and female Panchayat Raj leaders. Sample consisted of elected representatives (54 women and 118 male) from two districts Junagadh and Amreli of Gujarat state. Purposive sampling technique was adopted for sample at Village, Taluka and District level. Interview Schedule was used for obtaining the information. The data was kept for discriminate function analysis, mean and mean differences, tests of equality and the Wilk's Lambda. The results revealed that the main variables that discriminate between the two populations of male and female heads of panchayat raj institutions were age (0.885), education (0.640), land holding (0.245), and risk orientation (0.239) while family type (-0.022), family size (-0.158), political background (-0.380), attitude towards agriculture (-0.113) and extension contact (-0.032) were bringing them closer. Moreover, female to female discrimination was 70.40 per cent and it was 29.60 per cent in case of

female to male. On the other hand, the discriminate function between male to male was 72.90 per cent and it was 27.10 per cent between male to female. The reason for such variation in characteristics was inequality in the working environment, local power relations, gender differentials, and caste based divisions which influence the elected representatives.

GSA 13

Knowledge of tribal women towards sickle cell anemia in Vyara block of Tapi district

Arti N. Soni[1], A. J. Dhodia[2] and C. D. Pandya[3]

[1] and [2]Scientist and [3]Senior Scientist and Head, KVK, NAU, Vyara, Dist.Tapi

E-mail : sonyarti@gmail.com

ABSTRACT

Sickle cell anemia is one of the most common hereditary diseases worldwide, which may affect any organ or system of the human body. Sickle cell anemia is widespread among tribal communities in India. The tribal population contributes 15% of the total population of Gujarat and is distributed in various parts of the state. Tapi is a tribal-dominated district. A high prevalence of the sickle gene has been demonstrated in various tribal communities of Tapi, including Gamit, Chaudhari, Konkani, Dhodia, etc. So, to combat this disease, we need to focus on this tribal population. Knowledge plays a vital role in achieving desired results. Thus, the present study was carried out to assess the knowledge of tribal women towards sickle cell anemia in the Tapi district. The data was collected purposively from Vyara block of Tapi district with 100 tribal women with positive sickle cell status (sickle cell trait or sickle cell disease) in the age group of 18 years & above. The data was collected with the help of a structured interview schedule & analyzed with appropriate statistical tools. It is indicated from the results that the majority of tribal women were young aged, had sickle cell trait status, were married, in joint families, 5 to 6 members in the family, belonged to marginal land holding, and had annual incomes up to Rs.50,001 to Rs.1,50,000 and more than half of tribal women had education up to secondary level as well as no any type of social participation. The majority of tribal women were taking medical consultancy. Most tribal women had a low level of knowledge about sickle cell anemia. The independent variables, viz. education and annual income, had a positive & highly significant relationship with the knowledge of tribal women about sickle cell anemia. In contrast, social participation, occupation and medical consultancy had a positively significant relationship with the knowledge of tribal women about sickle cell anemia.

GSA 14

Knowledge of farm women in dairy occupation

R. U. Chaudhari[1], U. M. Patel[2], V. G. Tala[3]

[1] and [3]Ph. D. Student, Dept. of Agril. Extension and Communication, CPCA, SDAU

[2]Associate Professor and Head, Department of Veterinary Extension Education, K.U., Anand

E-mail : rajatchaudhari68.rc@gmail.com

ABSTRACT

Among the various animal husbandry practices, it has been playing a significant role by providing a source of revenue to rural people. Dairying is considered a "wealth" of the Indian rural economy. It offers profitable services to a vast majority of rural families. The present study was performed in Gujarat. The analysis is concerned with the Banaskantha region of Gujarat. The sample consisted of 150 farmwomen. Frequency and percentage were used for the study of data. From Banaskantha district, four talukas were selected randomly. From selected three talukas, four villages from three talukas and from one taluka, three villages were selected constituting 15 villages and ten farm women were selected randomly from each village having dairy occupation. From this analysis, it can be concluded that the majority of farm women belonged to

the middle age group, had primary school education, had a medium level of experience in a dairy occupation, had medium size of family, membership in one organization, marginal farmer, small herd size, medium group of source of information, medium level of milk yield. Most farm women were found to have a medium knowledge of dairy occupation. Knowledge of farm women was found to be significant with age. At the same time, the size of land holding and source of information were highly substantially correlated with the farm women's knowledge of dairy occupation. Experience in dairy occupation, social participation, herd size and milk yield were found to be non-significant. At the same time, education and size of the family were found negative and non-significant.

GSA 15

Knowledge of rural women about agro-based enterprises in South Gujarat

A. J. Dhodia[1], J. B. Butani[2] and C. D. Pandya[3]

[1] and [2] Scientist, KVK, NAU, Vyara, Dist.Tapi

[3]Senior Scientist & Head, KVK, NAU, Vyara, Dist.Tapi

E-mail : arpit0694@nau.in

ABSTRACT

Agriculture is the female workforce that governs the mainstay of the rural Indian economy. Women are the invisible lifeline of the agrarians. Women dominate as agricultural labour, working manually while men are involved with machinery. Empowering rural women through agro-based enterprises is directly concerned with their knowledge. Thus, the present study was carried out to assess rural women's knowledge about Agro-based Enterprises in South Gujarat. Considering the past thesis, research studies were referred, and with the help of KVKs, ATMA and NGOs, enterprise-wise proportion of rural women was obtained and major four enterprises *viz.* Dairying, Vermicomposting, Value addition/food processing and beekeeping were selected for the study. Each enterprise requires such environment, resources and market availability to grow. For agro-based enterprises handled by rural women under the study area, the size of respondents in South Gujarat was considered total and randomised by lottery method to get 40 sample sizes for each selected agro-based enterprise. Beekeeping is a susceptible enterprise; hence, only 30 active female beekeepers were found in the study area of South Gujarat. A total of 150 respondents were selected for the study. The majority of the rural women found in the middle age group belonged to schedule tribe, possessed secondary level education, belonged to a nuclear family, belonged to small family size, had medium credit-seeking behaviour, frequently assessed the source of information, moderately utilised information sources, lower annual income, the small size of land holding, low animal possession, trained rural women and a medium level of risk orientation. Most rural women had a medium level of knowledge about agro-based enterprises. The majority of rural women reported the major constraint in agro-based enterprises was 'predominant reliance on family saving to start agro-based enterprises and Majority of rural women suggested that 'Banking policies should be supportive to women entrepreneurs.

GSA 16

Nutritional status and daily diet pattern of tribal farm women of Dahod district

Ekta H. Pandya, Harsh Desai and Aniket Makani

Research Associate

Tribal Research cum Training Centre, AAU, Devgadh Baria

ABSTRACT

India is home to a tribal population. Tribal women play multiple roles in a family, primarily as mothers and housekeepers and equally important roles as wage earners, agricultural producers, nutrition providers, etc. They are instrumental in acquiring food, its preparation, storage and distribution. However, they are often

subjected to malnutrition and from a highly vulnerable group to morbidity and mortality. Rao (1994 and 1996) noted that tribal people contribute about 8% of the total population in India, with varying proportions in different states. They live in unique physical, socio-economic and cultural environments, isolated from the general population. Their food intake is influenced by the vagaries of nature, with large seasonal variations depending upon the availability of agricultural and forest produce. The present study was conducted in the operational area of the Tribal Research cum Training Center in Dahod district. An exploratory research design was used for the analysis. Purposive sampling techniques were used for the selection of tribal talukas, villages and respondents for the studies. Five Talukas, namely, Garbada, Dahod, Zalod, Fatepura and Dhanpur, were selected for the study. From each Taluka, six villages were chosen randomly. From each selected village, ten tribal farm women were selected randomly, thus making the total sample of 300 tribal women. Most (66%) of tribal farm women were between 150 and 165cm tall. It also showed that more than one-fourth (31%) of tribal women had a height of less than 150 cm. The majority (57.67%) of tribal farm women weighs between 40-50 kg, 20.33% of tribal farm women weighed 40 kg, and only 27% of tribal farm women showed a BMI in the acceptable range category. Large numbers of tribal farm women (66%) were found to be underweight. It was observed that breakfast was not regularly consumed and skipped frequently. Both vegetables and dal were not consumed together in a single meal. Evening-time snacks were consumed occasionally. It was found that the tribal farm women did not follow the proper meal. Independent variables viz. annual income, family size and occupation had negative and significant correlation with the nutritional status of the tribal farm women at 0.05 levels. In contrast, age, education, marital status, and the number of children could not establish any significant correlation with the nutritional status of the tribal farm women. The probable reason might be that most tribal farm women were illiterate, had low annual income, had heavy physical workloads in Agriculture + labour + animal husbandry as their primary occupation, and lived in joint families.

GSA 17

Participation pattern of rural women in household production system

M. R. Bhatt[1], Patel Maulika G.[2] and Dhandhukia R. D.[3]

[1]Associate Professor, [3]Assistant Professor, College of Agriculture, NAU, Bharuch

[2]Agriculture Officer, Dept. of Agriculture, Gandhinagar

E-mail : mrbhatt39@gmail.com

ABSTRACT

Rural women are the invisible lifeline of the agrarian rural community. They are not only pioneer of the domestic tasks but also give incomparable contribution in farming activities also. Even, to maintain the household economic condition they also participate in non-farming or income generating activities. The success of any community highly depends on the participation of women in varied activities. The community is nothing without women. The participation of rural women in household production system is incredible. But, there is statistical bias in under estimating the position of rural women in development. Women work for longer hours than men, contribute appreciably to household income but still they are not perceived as productive workers. The study was conducted in Navsari district. The results indicated that majority of the rural women had medium to low level of participation in household production system with medium level of participation in farm activities, home activities, off farm activities and communal activities. Social participation, innovativeness and self-confidence had positive and significant relationship with participation in household production system. Farming experience, extension participation, source of information, risk orientation and market orientation had positive and highly significant relationship with participation in household production system. Main constraint perceived by respondents was prescribed roles of women in society. It was followed by higher time consumption for household, child care and agricultural work at same time increased the work load, poor educational background, and dominance of male members in family.

GSA 18

Participation of farm women in different dairy practices: Advanced approach for food and nutritional security

S. B. Patel, Umang B. Patel and J. B. Delvadiya
Ph. D. Scholar, NMCA, NAU, Navsari
E-mail: patelshivangi1005@gmail.com

ABSTRACT

Women are the back bone of rural economy. The prosperity and growth of nation depends on the status and development of its women as they not only constitute nearly half of the population but also positively influence the growth of remaining half of the population. The present study was conducted to know the extent participation of farm women in dairy occupation in Bharuch district of Gujarat state with sample of 120 respondents. Farm women were participated in many activities like selection of milch animals, taking loan for purchase animal, purchase and sale of milch animals, feeding of milch animals, breeding of milch animals, health care of animals and utilization of milk and preparing milk products. Farm women and their participation in dairy occupation were certainly affected their efficiency in work and in the development of dairy enterprise. Majority of farm women participated in feeding the milch animals, utilization of milk and preparing milk products and breeding of milch animals.

GSA 19

Participation of dairy farm women in dairy farming

S. J. Jadav[1], J. K. Patel[2] and V. M. Chaudhary[3]
[1]Dairy Vigyan Kendra, SMC College of Dairy Science, Kamdhenu University, Anand
[2]Extension Education Institute, Anand Agricultural University, Anand, Gujarat
[3]PG student, College of Veterinary & A. H., Anand
E-mail: sanjay.jadav89@gmail.com

ABSTRACT

This study was conducted to explicate participation of dairy farm women in dairy farming. A total of 160 respondents from 16 villages belonging to 4 talukas of Panchmahals were selected randomly. Most of the activities related to dairy farming activities were carried out by women. Under nutrition practices women involved actively in feeding of young calf, fodder collection, watering, storage of feed & fodder, offering the concentrate to animals, feeding the animals etc. They were mostly involved in cleaning of utensils, disposal of dung, milking, care of newborn calf and colostrum feeding to new born calf. Under breeding involvement during parturition, giving warm water bath after calving, care during pregnancy and detection of heat were performed by farm women. They also took care of healthcare activities like care of pregnant, new born & sick animals, taking animal for vaccination, taking animal for treatment etc. Farm women were comparatively less involved in insurance, getting loans, purchase of feed and fodder, purchase of other goods for animals and construction of shed. Women interested to making of curd and butter milk but they least interested for making *mava* and *ghee*. Women were less interest for making milk products because of their interest is to sell milk. Involvement of dairy women was highest in nutrition activities followed by management, breeding, health care, value addition of milk and finance. In financial and value addition of milk type of activities, women were less involved.

GSA 20

Personal, social and psychological characteristics of the members of the women farmers interest group under ATMA

Vinod Kumar[1], K. L. Chaudhary[2], R. M. Naik[3] and R. M. Bhuva[4]

[1]M.Sc. Scholar, [2] and [4]Assistant Professor Dept. of Agricultural Extension & Communication, [3]Principal and Dean, N. M. College of Agriculture, Navsari Agricultural University, Navsari

E-mail: vinodextension427@gmail.com

ABSTRACT

Women Farmers Interest Group (FIG) is a self- managed, independent group of women farmers with a shared goal and interest. The women members work collectively to achieve the set goals. The study was conducted with the personal, social and psychological characteristics of women members of FIGs under ATMA. The present study was carried out in Navsari district of Gujarat State. Navsari district comprises six talukas, out of which two talukas viz. Jalalpore and Navsari having, a higher number of women FIGs were selected. Five FIGs were selected randomly from each taluka, out of which ten members from each FIG were selected randomly. Thus, 100 FIGs members were selected randomly from those two talukas. The interview schedule was used for data collection and the collected data analyzed by using percentage, mean and standard deviation. The study found that 58.00 per cent of the respondents belonged to the middle age group, 42.00 per cent of the respondents had a primary school level of education, 45.00 per cent of the respondents were involved in farming coupled with animal husbandry, 38.00 per cent of the respondents had a low level of annual income, 65.00 per cent of the respondents had membership in more than one organization, 51.00 per cent of the respondents had a medium level of extension contact, 52.00 per cent of the respondents had a very high level of economic motivation and 46.00 per cent of the respondents showed high level of innovativeness.

GSA 21

Socio-economic profile of rural women in involvement of farm and home decision making in Valsad district of South Gujarat

Preeti Tetarwal[1], O. P. Sharma[2], Vinod Kumar[3]

[1]Ph.D. Scholar, Dept. of Extension Education, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur

[2]Professor & Head, [3]M.Sc. Scholar, Dept. of Agricultural Extension & Communication

N. M. College of Agriculture, Navsari Agricultural University, Navsari

E-mail: preetitetarwal001@gmail.com

ABSTRACT

Rural women are important in bringing about the overall social changes essential for sustainable development. The involvement of rural women in decision-making will enhance productivity, efficiency, sustainable development, food security and societal development. The present study was carried out in the Valsad district of South Gujarat. Valsad district consists of six *talukas* viz. Valsad, Vapi, Pardi, Umbergaon, Kaprada and Dharampur and all *talukas* were selected. Two villages from each selected *taluka* and ten members from each village were selected randomly. Thus, a total of 120 respondent rural women were selected. An interview schedule was used for data collection, and the collected data were analyzed using percentage, mean and standard deviation. The study found that 40.83 per cent of the respondents belonged to middle age group, 30.00 per cent of the respondents had high school level of education, 38.33 per cent of the respondents had 7 to 8 family members, 61.67 per cent of the respondents were from joint family, 60.00 per cent of the respondents had medium level of decision making ability, 72.50 per cent of the respondents had medium level of management orientation, 64.17 per cent of the respondents had medium level of leadership ability.

GSA 22

Symbolic adoption of selected drudgery reduction technologies related to agriculture by the farm women

Neha Tiwari[1], Rajshree Upadhyay[2] and Jiju N. Vyas[3]

[1]Scientist KVK, JAU Amreli, [2]Professor, College of Community and Applied Sciences, MPUA&T Udaipur, [3]Senior scientist & head KVK, JAU, Nanakandhasar

E-mail- nehatiwari@jau.in

ABSTRACT

The present study was conducted in Gonda district of Uttar Pradesh state. Since, the present study was an action research which required support of organization and functionaries working in the field of agriculture, it was conducted at Krishi Vigyan Kendra, Gonda. Gonda district consists of 16 panchayat samities, out of which two panchayat samties i.e. Paraspur and Jhanjhari were purposively selected. 11 technologies viz. wheel hoe, manual rice transplanter, manual seed drill, knapsack sprayer, serrated sickle, manual bund former, maize sheller and ground nut decorticator, were selected for technological empowerment of farm women through training and intervention. Personal interview technique was used for collecting data. The objective of the present paper was to assess symbolic adoption of selected drudgery reduction technologies related to agriculture by the farm women after giving training and intervention of all the above technologies. The result of the symbolic adoption of agriculture technology reveals that majority of the respondents (85-90%) were satisfied with the use of agriculture technologies i.e. wheel hoe, rice transplanter, manual seed drill, knapsack sparer, manual bund former, serrated sickle, maize sheller and ground nut decorticator. Majority of them (80-90%) wanted to use these technologies at their farm and also expressed their desire to purchase the technology.

GSA 23

The role of women in ensuring food and nutritional security: A multidisciplinary approach

Jeni Lalwani and Tejasveeta Bavishi

ASPEE College of Nutrition and Community Science, SDAU, Sardarkrushinagar

ABSTRACT

The paper explores the research on the diverse roles of women in promoting food security in developing nations. This study examines women's roles in food production, providing food for the household and contributing to household nutrition security. The report presents evidence that addressing gender disparities through enhancing women's physical and human capital contributes to agricultural growth, improved income for women, and enhanced food and nutrition security for all. The discussion covers various aspects, including the three pillars of food security, the role of women in agricultural production, their economic access to food, and their impact on nutritional security. Despite resource limitations, women in developing countries are essential in addressing their families' food and nutrition requirements.

GSA 24

Empowerment of women by Self Help Groups

Manvar H. A.[1] and Rajpura M. R.[2]

[1]Ph.D. Scholar, Bhakta Kavi Narsinh Mehta University, Junagadh

[2]Asso. Professor, UKV Mahila Arts and Home Science College, Keshod, Bhakta Kavi Narsinh Mehta University (Junagadh), India

ABSTRACT

Empowerment of women is essentially the process of upliftment of the economic, social, and political status of women in society. Women constitute almost 50% of the world's population, but India has shown a disproportionate sex ratio, whereby females' population has been comparatively lower than males. As far as

their social status is concerned, they are not treated as equal to men in all places. In Western societies, women have equal rights and status with men in all walks of life. This experiment was conducted at Rajkot District, Gujarat, India during January–July, 2022 to assess the level of empowerment of women by Self Help Groups. A cross sectional study was designed in rural and urban areas of Rajkot district. An open-ended questionnaire was used for data collection on parameters relating to women empowerment through house-to-house survey. Mean age of participants was 31.54±6.45 years, 14.10% were illiterate, majority of women were engaged in agricultural works in their own farm, 77.3% women having pucca type of household and 95.7% were having ownership of their house. About 63.30% women were from medium family size. 31.7% respondents were studied up to standard 5fi8th only and 53.1% having main source of income from agriculture. The condition was worse for rural and urban slum women. 35.8% of the women having cow as household own livestock animal, which was lower in case of urban women. Majority of the women had household assets viz; Pressure cooker, Electric fan, Television, Gas stove and improved grain storage bin. Education, employment had a positive impact on status of women in relation to empowerment.

GSA 25

Ways to increase participation of farm women in agricultural development

Nidhi B. Thakur[1] and J. B. Patel[2]

[1]Research Associate, Extension Education Institute, AAU Campus, Anand

[2]Associate Professor, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

E-mail: nidhi.thakur2794@gmail.com

ABSTRACT

The present study entitled was conducted with a sample of 200 respondents. The ex-post facto research design was used for the research study. The study was carried out in Vadodara district of Gujarat. From these four Talukas were selected on the basis of area under higher cotton production *viz*, Karjan, Dabhoi, Sinor and Padara. The study was conducted to know several ways to increase participation of farm women in agricultural development. The findings suggest that for rising the participation of farm women in agricultural development, the variables such as occupation, attitude towards agricultural development, social participation, management orientation and attitude towards family welfare should be emphasized. All these five variables predicted 60.10 per cent of the total variation in the extent of participation of farmwomen. There were also some major suggestions given by farmwomen were provision of ownership of land along with men in the family, farm women should be provided credit by banks on soft terms to support their livelihood, providing opportunities for groups to develop linkages with input suppliers and markets, provision of proper training to farm women enhance knowledge and skill in agriculture and family welfare, skill oriented training programmes should be provided among adolescent girls and young mothers, extension personnel should provide continuous assistance to farm women about production process and management.

GSA 26

Perception of rural parents' on gender discrimination

Shastri Hasumati D. and Neeta Khandelwal

ASPEE College of Nutrition and Community Science, SDAU

Email: hdshastri@gmail.com

ABSTRACT

In an ideal society, gender balance is natural and unbiased. However, pervasive discrimination against women in Indian society begins early in life, exemplified by practices like female feticide and infanticide. This study investigated rural parents' perceptions of gender discrimination in Mehsana district, Gujarat, with a focus on preferences for a girl child, girl's education, and nutrition/health care. The district was purposively selected based on low female sex ratios and high feticide rates. Data from 200 respondents (100 couples) were collected through structured interviews. The majority of parents was middle-aged, educated up to high

school, with nuclear families, low income. They exhibited a high level of change proneness, cosmopolitanism, and liberalism. Parents expressed negative perceptions regarding a preference for a girl child but positive views on girl's education and health care. Noteworthy findings include fathers having more positive perceptions than mothers regarding girl's education and health care. Reasons for discrimination included traditional beliefs, economic factors, and cultural norms. Religion played a significant role in shaping discriminatory views. Age negatively correlated with girl's education, while education correlated positively with both education and health care perceptions. Mass media exposure correlated positively with education and health care but negatively with a preference for a girl child. Social participation and urban contacts positively associated with education and health care perceptions.

GSA 27

Women in agriculture: Bridging the gender gap for food security

Riddhi Mor[1] and Simple Jain[2]
Department of Extension Education and Communication Management
ASPEE College of Nutrition and Community Science, SDAU, Sardarkrushinagar

ABSTRACT

The role of women in agriculture is pivotal in ensuring global food security, yet they often face significant gender disparities that hinder their full potential. This abstract explores the challenges and opportunities in bridging the gender gap within the agricultural sector to enhance food security. Women constitute a substantial portion of the agricultural workforce, contributing significantly to food production, processing, and distribution. Despite their indispensable role, women frequently encounter barriers such as limited access to resources, education, and technology. These constraints impede their ability to maximize productivity and contribute to overall food security. Addressing these challenges requires comprehensive strategies that promote gender equality, empowering women to actively participate in decision-making processes and gain equal access to agricultural resources. Efforts to bridge the gender gap in agriculture can yield numerous benefits. Empowering women in agriculture enhances household food security by improving agricultural productivity and diversification. Additionally, it contributes to broader economic development as women reinvest their income into their families and communities. To achieve these outcomes, interventions must encompass policy changes, educational initiatives, and targeted investments in women-centric agricultural technologies. From seed selection to post-harvest activities, women's contributions are integral to the entire agricultural value chain. By bridging the gender gap, we not only enhance the status of women but also fortify the foundation of global food security in an increasingly complex and interconnected world.

GSA 28

A review of food security among tribal farm women of Gujarat

N. H. Usadadiya[1], P. P. Jadav[2]
Department of Agricultural Extension and Communication, BACA
Anand Agricultural University, Anand-388110
Email: nirali81998@gmail.com

ABSTRACT

Food and nutrition security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for an active and healthy life and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy active life (FAO). Food security is a complex phenomenon. It has three dimensions 1. Availability of food - Presence of enough food for all purposes. 2. Accessibility of food - Absence of barrier on access of food. 3. Affordability of food- Capacity of all persons to buy food of acceptable quality. The average requirement of cereals per person in the country is 427 grams per day. Hunger is the most deplorable

manifestation of poverty. This can manifest itself in the form of starvation, chronic under nutrition or specific nutrient deficiencies. Delves into the intricate and longstanding challenge of food security. The critically reviewed papers emphasize the paramount importance of food security, particularly for vulnerable groups such as tribal populations, including its various dimensions, among the tribal population in over the years. However, these advancements have positively impacted food availability and accessibility, challenges persist in addressing the issue of food utilization. The cultural and social transformations within the tribal population as key factors influencing this aspect and that efforts to enhance food security should not only focus on economic factors but also consider the cultural and social dimensions affecting food utilization among tribal communities.

GSA 29

Personal, socio-economic, communicational, psychological and situational characteristics of farm women in dairy occupation

R. U. Chaudhari[1], U. M. Patel[2] and V. G. Tala[3]

[1] and [3]Ph. D. Student, Department of Agricultural Extension and Communication, SDAU., S.K.Nagar

[2] Associate Professor and Head, Veterinary College, K.U., Anand

Email: rajatchaudhari68.rc@gmail.com

ABSTRACT

Livestock is generally considered a key advantage for rural livelihoods. Rural women play critical, miscellaneous roles in livestock production in the rural economies of developing countries as voluntary workers. They embark on various activities of livestock management like watering and feeding of animals, cleaning activities and milking. The present paper aims at highlighting the socio-economic, communicational, psychological and situational characteristics of farm women. The analysis is concerned with Banaskantha region of Gujarat. The sample consisted of 150 farm women. Frequency and percentage were used for analysis of data. From banaskantha district, four talukas were selected randomly. From selected three taluka, four villages each and from one taluka three villages were selected constituting 15 villages and ten farm women were selected randomly from each village having dairy occupation. From this analysis it can be concluded that majority of farm women belonged to middle age group (61.34%), primary school education (46.00%), medium level of experience in dairy occupation (70.00%), medium size of family (52.67%), membership in one organization (87.34%), marginal farmer (38.00%), small herd size (62.67%), medium level of source of information (55.34%), medium level of milk yield (74.00%).

Transfer of Technology and its Impact (TOT)

TOT 1

Effect of biological agents in management of whitegrub in groundnut

V. M. Savaliya[1], J. V. Chovatia[2] and D. N. Hadiya[3]

[1]Assistant Professor, ASPEE College of Agriculture, JAU, Khapat (Porbandar)

[2]Assistant Professor, Deptt. Of Agril. Extension, COA, JAU, Junagadh

[3]Agri. Officer, Krishi Vigyan Kendra, JAU, Khapat (Porbandar)

Email: vmsavaliya@jau.in

ABSTRACT

Groundnut is a major *kharif* crop of Saurashtra region of Gujarat which accounts for nearly 35 percent of sowing area in the season. Porbandar district having nearly 75 percent sowing area under *kharif* groundnut. Whitegrub is a most destructive pest in groundnut in the region which lowers yield significantly, if not manage properly. An on farm testing was conducted in Porbandar district by Krishi Vigyan Kendra, Porbandar for 3 years from 2018-19 to 2020-21. Three treatments were tested viz., T1 - farmer's practice – drenching of chlorpyrihpos @ 4 lit/ha at the time of attack; T2 - recommended practice – seed treatment with chlorpyriphos @ 25 ml/kg, spraying the trees on bund with carbaryl @ 40 g/15 lit water; T3- intervention - soil application of *Metarhizium anisopliae* and *Beauveria bassiana* @ 2.5 kg/ha at the time of sowing. Both the biological agents were applied separately to study their effect and comparison. The results shows that average yield in *Metarhizium anisopliae* treatment was 16.58 q/ha, which was higher as compared to other treatments viz., *Beauveria bassiana* (15.11 q/ha), farmer's practice (13.60 q/ha) and recommended practice (16.00 q/ha). Moreover, average whitegrub population/m^2 was 5 in farmer's practice as compared to 1 in all other practices.

TOT 2

Adoption of health care management practices in goat by tribals of Tapi district

J. B. Butani[1], A. J. Dhodia[2] and C. D. Pandya[3]

[1] and [3]Scientist, [2]Senior Scientist & Head, KVK, NAU, Vyara – 394650

Email: drjbb2708@nau.in

ABSTRACT

Tapi is a tribal dominated district of Gujarat state and their traditional occupation in livestock aspect is to rearing cattle, buffaloes, goats and desi fowls. The present study was carried out in Tapi district to find out the adoption of health care management practices in goat followed by tribal in Tapi district. Two blocks of Tapi district namely Songadh and Uchchhal were selected purposively as majority goat rears are present in these two blocks in Tapi district. Total 100 respondents had been selected for this study. Nearly half of the respondents were in the young age, Nearly two fifth of the respondents possessed primary level of education and more than two fifth of the respondents having small family size, slightly more than three fifth of the respondents had medium family income, more than three fifth respondents belonged to low land holding category, more than two fifth of respondents had large goat possession, half of the respondents had large farming experience. Extent of adoption regarding treatment of sick goat ranked first while zero adoption was observed for navel disinfection and dehorning in kid. Major constrain faced by tribal people was lack of availability of veterinary services at door step.

TOT 3

Effect of pail vs. nipple bucket milk feeding method on health status of crossbred calves

J. H. Patel[1], M. M. Trivedi[2] and K. N. Wadhwani[3]

[1]Assistant Professor, College of Veterinary Science & A. H., KU, Anand

[2]Director of Extension Education, Kamdhenu University, Gandhinagar

[3]Research Scientist and Head, Livestock Research Station, KU, Anand

Email: jigarpatel@kamdhenuuni.edu.in

ABSTRACT

The present study was planned to study effect of milk feeding method on performance of preweaned crossbred calves. The study was conducted on 36 preweaned crossbred calves at Livestock Research Station, Anand Agricultural University, Anand. All the calves were divided into two group (T_1- Pail method of eighteen calves in each for the period of 84 days. All the calves were offered 4 kg fixed quantity of milk for first week of life followed by 16 %, 8% and 4 % of 35, 56 and 84 days of life. Fecal consistency was recorded 84 days of life where high milking 16 % of body weight offered. The score pattern 1, 2, 3 and 4 showed normal, soft, very soft and runny based on scientist description. The present study was found that overall fecal scores of calves were observed to be 83.73, 5.95, 6.55 and 3.18 % in score-1, 2, 3 and 4, respectively that means calves showed normal fecal consistency (score-1) in 70.33 out of 84 days of milk feeding. The overall fecal consistency and incidence of diarrhea were 1.28 and 2.25 in respectively. The fecal consistency per day of calves under bucket with nipple (1.36) was observed 11 % lower as compared to calves under pail method (1.21). The incidence of diarrhea in calves under bucket nipple (1.61) was recorded 21.11 % lower as compared to pail milk feeding (2.88) method. This was might be due to suckling of milk lead to increased saliva secretion, proper mixing of enzymes leads to normal fecal consistency and maintaining hygiene of milk.

TOT 4

Impact of frontline demonstrations on yield of chickpea (*Cicer arietinum* L.) in Porbandar district of Gujarat state

Hadiya, D. N[1], V. M. Savaliya[2] and H. R. Vadar[3]

[1]Agriculture Officer, Krishi Vigyan Kendra, JAU, Khapat (Porbandar)

[2]Assistant Professor, ASPEE COA, JAU, Khapat (Porbandar)

[3]Senior Scientist and Head, Krishi Vigyan Kendra, JAU, Khapat (Porbandar)

Email: hadiyadileep@gmail.com

ABSTRACT

The present study was conducted to assess the impact of frontline demonstrations of chickpea crop in the Porbandar district of Gujarat state. Chickpea (*Cicer arietinum* L.) is a highly nutritious grain legume crop and is widely appreciated as health food as well as high return crop. Front line demonstrations of chickpea improved variety GJG-6 were conducted at 100 farmers' fields of Narena, Moddar, Trakhai, Mahiyari and Devda villages of Porbandar district for the year 2021-22 and 2022-23, to exhibit the performance of new high yielding variety of chickpea (GJG-6) and compare the yield of demonstrated variety with the local check. The improved technologies gave higher yields and recorded a mean yield of 18.10 and 15.05 q/ha during year 2021-22 and 2022-23, respectively which was 12.07 and 14.10 percent higher as compared to prevailing farmers practice. The average percent increase in yield of demonstrated plot was recorded 13.09 percent during the two year of programmes. Technology gap, extension gap and technology index values were 10.65 q/ha, 1.91 q/ha and 39.11 percent, respectively. Result depicts that FLD is a successful tool to

enhance the production and productivity of chickpea crop through improve knowledge of farmers about improved variety of chickpea and its improved cultural practices.

TOT 5

Nutritional status and performance of dairy buffalo in Ahmedabad district

J. H. Patel[1], J. K. Patel[2] and R. J. Modi[3]

[1] and [3]Assistant Professor, College of Veterinary Science & A. H., KU, Anand

[2]Director, Extension Education Institute, AAU, Anand

Email: jigarpatel@kamdhenuuni.edu.in

ABSTRACT

The present study was conducted on validation of findings of nutritional status of dairy animals in Ahmedabad district. Total 30 dairy buffaloes producing 5-7 kg/d were selected from different villages of the district and divided into two group based on nutritional status viz., control and treatment group. Effect of ration balancing on milk yield (kg/d), fat % and conception rate (%) were studied and analysed by using statistical tool. Present investigation found that buffaloes producing 5-7, kg/d in the district having on an average 6.23± 0.14, 6.55± 0.12, 8.61± 0.21 of milk (kg/d), Fat (%) and 6 % FCM, respectively and consumed 10.13 ± 0.34, kg/d total dry matter (TDM). The Buffaloes were found deficient in 14.44% DCP and 9.59% TDN. So, Additional 1.0 kg concentrate mixture supplied to buffaloes as per recommendation given by Animal Nutrition Department, AAU, Anand and found that buffaloes yielding 5 to 7 kg/d milk produced 0.84 and 0.10 kg more FCM in treatment and control group, respectively. The treatment group produced 11.90 % more FCM than Control group. The conception rate of treatment group buffaloes were found higher 13.33 % than control group. The present study revealed that additional 1.0 kg concentrate mixture improved fat corrected milk and conception rate in buffaloes producing 5-7, l/d in Ahmedabad district.

TOT 6

Seeding change: Exploring the impact of technology transfer on agricultural development

R. S. Ghasura[1] and M. R. Bhatt[2]

[1]Assistant Professor, College of Veterinary Science and Animal Husbandry, KU Navsari

[1]Principal, Polytechnic in Agriculture, Bharuch, NAU, Navsari

Email: rghasura21@kamdhenuuni.edu.in

ABSTRACT

The paper provides a comprehensive analysis of technology transfer's transformative effects on agriculture emphasizing sustainable growth, enhanced food security, and improved livelihoods for local farmers, the research is grounded in a robust theoretical foundation encompassing technology adoption, innovation diffusion, and sustainable development. By synthesizing these concepts, the paper establishes a strong basis for understanding the intricate dynamics of successful technology integration and its socio-economic outcomes. The highlights technology transfer's tangible impact through varied case studies spanning geographic and socio-economic contexts. Advanced techniques like precision farming, resilient crop varieties, efficient irrigation, and post-harvest technologies are showcased as catalysts for addressing challenges faced by local farmers. Recognizing transfer complexities, the paper critically examines impediments hindering seamless adoption of innovative agricultural technologies, including cultural differences, resource constraints, and infrastructure limitations. Additionally, it underscores opportunities presented by technology transfer, such as increased productivity, reduced ecological footprint, and heightened climate resilience. Distilling insights from case studies and theoretical analyses, the paper offers actionable recommendations for policymakers, researchers, and practitioners. It advocates for effective

technology transfer programs, cross-cultural collaboration, and integration of indigenous knowledge systems into agricultural frameworks. In conclusion, "Seeding Change" reveals technology transfer's far-reaching impact on agriculture. The paper underscores the urgent need for collaborative efforts to harness its revolutionary potential for global food security and sustainable agricultural practices.

TOT 7

Relationship between selected characteristics of mango growers with adoption of recommended production technology

V. G. Tala[1], S. R. Salunkhe[2] and D. B. Patel[3]

[1]Ph. D. student, Dept. of Agri. Extension & Communication, CPCA, SDAU, Gujarat

[2]Scientist, Extension Education (KVK), NAU, Navsari, Gujarat

[3]Professor & Head, Dept. of Agri. Extension & Communication, CPCA, SDAU, Gujarat

Email: vivektala105@gmail.com

ABSTRACT

Mango (*Mangifera indica L.*) is the premier fruit of India. Mango fruit is rightly known as 'National fruit of India' and also the 'King of Fruits. Higher temperature during fruit development and maturity gives better quality fruits. The Gujarat Mango Hybrid-1 (GMH-1) was released in the year 2000 from Agriculture Experimental Station, Paria by giving the name Sonpari. Sonpari is heavy yielder and regular in bearing. The present study was conducted in South Gujarat region. Navsari district have six talukas. All talukas were selected purposively by considering mango production technology. Four villages were randomly selected from selected taluka. Thus, the total number of villages for the study were twenty four. From each village, 5 mango growers were randomly selected. Thus the sample size were 120 respondents for this study. Ex-post facto research design was used. The study reveal that, out of fourteen independent variables, Annual income, scientific orientation, innovativeness, education, Size of land holding social participation, mass media participation, innovativeness, extension contact, risk orientation, market orientation and farming experience were found positive significant relationship with level of adoption. While age was found negative significant relationship with level of adoption. Type of family was found positive but non-significant relationship with level of adoption.

TOT 8

Adoption of management practices of drip irrigated potato

V. V. Prajapati, S. H. Malve, Y. D. Pawar and R. S. Prajapati

Krushi Vigyan Kendra, Deesa, Sardarkrushinagar Dantiwada Agricultural University

Email: vvprajapati1963@sdau.edu.in

ABSTRACT

Potato has emerged as fourth most important food crop in India after rice, wheat and maize. Now, it becomes as an essential part of breakfast, lunch and dinner worldwide and grown more than 100 countries. Nutritional point of view, potato is a wholesome food and deserves to be promoted as a potential high-quality vegetable cum food crop in the country. Banaskantha (52000 ha) having highest potato cultivation next to Sabarkantha 21,400 ha. Drip irrigation is a form of irrigation that saves water and fertilizer by allowing water to drip slowly to the roots of many different plants. Majority of farmers in Banaskantha district adopted sprinkler irrigation in potato crop. Our recommendation says that drip irrigation is better than sprinkler irrigation. So, the study "Adoption of drip irrigation in potato crop of Banaskantha District" was plan. The present study was conducted purposively in Banaskantha district because of higher area under Potato and more adoption of MIS as compared to other districts of North Gujarat Agro Climatic Zone. Among the 14 talukas of Banaskantha district 3 talukas i.e., Deesa, Vadgam and Palanpur having highest area under Potato

cultivation were selected, 15 villages were purposively selected from the selected talukas. From each selected village, 8 farmers were selected randomly making a sample of 120 respondents. majority (58.33%) of the drip owners had Medium to moderate Knowledge level of Farmers About Scientific Potato Cultivation practices. This might be due to medium to high level of knowledge of drip owners towards drip irrigation system. Knowledge about drip irrigation system was found to be moderate to high (60.83%). Majority of respondents (58.33%), were found having moderate to high level of adoption of management practices of drip irrigation system. The major constraints faced by the drip owners in adoption of drip irrigation system were; frequent clogging of drippers due to saline substance or other reasons, damage caused by the rats to the system, lack of technical know-how and guidance before and after adoption, initially requires large investment for drip installation and lack of after sale service by the company dealers.

TOT 9

An assessment of farmers' preference of high yielding rice varieties released by Assam Agricultural University

Jyotishna Borgohain, Pallabi Bora and Pallabi Das
Department of Extension Education
Assam Agricultural University, Jorhat, Assam
Email: pallabi.das@aau.ac.in

ABSTRACT

Assam Agricultural University is putting its innovative efforts to provide the best rice cultivars for the farmers of the country. Many high yielding varieties of rice have been released by the University till date with the motive of increasing the production and productivity of rice. But it has been reported by many researchers that the traditional varieties are still cultivated by the farmers in a large scale in comparison to the HYVs of rice. Therefore, it was found necessary to know the farmers' preference of the HYVs over the traditional varieties of rice. The four major agro-ecological situation of Jorhat district were selected purposively for the study. Total number of 120 respondents was considered as the final sample of the study. To find out the preference of the rice varieties, matrix ranking was carried out with the participation of the farmers. The study revealed that the area under the HYVs was less in comparison to the traditional varieties of rice in the district and it was also revealed that traditional varieties were preferred by the farmers for Ahu, Sali and Bao rice in AES-I & AES-II and although the high yielding varieties were most preferred in AES III & AES IV, but the score range against each criteria of rice was found to be less. Therefore, the government and research wings should take initiatives for refinement of the HYVs and take initiatives to aware the farming community about the benefits of HYVs.

TOT 10

Enhancing dairy animal feeding practices with bypass fat under Farmer First Programme in South Gujarat

N. B. Patel[1], Durgga Rani.V[2]. and Y. D. Padheriya[3]
[1]Associate Research Scientist, LRS, KU, Navsari
[2] and [3]Assistant Professor, College of Veterinary Science and A.H., KU, Navsari
Email: nbpatel1978@kamdhenuuni.edu.in

ABSTRACT

A study on feeding management practices of 80 beneficiary dairy farmers, specifically those achieving 10 or more liters/day milk production per cow, across Kesali, Changa, and Vadsagar villages in Navsari District under Farmer First Program (FFP), Navsari Agricultural University, Funded by ICAR", this study offers a comprehensive analysis of the pre-bypass fat feeding dairy husbandry practices in these areas. The

research explores the dairy husbandry practices preceding the introduction of bypass fat supplementation. It sheds light on the traditional feeding approaches employed by these farmers and the challenges they faced. Subsequently, the study evaluates the impact of bypass fat feeding on these practices, focusing on improved nutrition, animal health, and overall farm sustainability. This study provides valuable insights into how bypass fat intervention can revolutionize feeding management practices in dairy farming and, consequently, elevate milk production and farm viability.

TOT 11

Impact of frontline demonstrations on yield of wheat (*Triticum aestivum* L) in Porbandar district of Gujarat state

V. M. Savaliya[1], H. A. Patel[2] and H. R. Vadar[3]

[1]Assistant Professor, ASPEE College of Agriculture, JAU, Khapat (Porbandar)

[2]Scientist, Krishi Vigyan Kendra, JAU, Khapat (Porbandar)

[3]Senior Scientist and Head, Krishi Vigyan Kendra, JAU, Khapat (Porbandar)

Email: vmsavaliya@jau.in

ABSTRACT

Wheat is a major *Rabi* crop of Gujarat state accounts for nearly 29 percent of sowing area in the season. Porbandar district having nearly 20 percent sowing area under Rabi season. Most of the varieties are old which were under cultivation and gives lower yield. Wheat variety GJW-463 released by JAU in 2015-16 is having potential yield of 67.46 q/ha, if timely sown. Front line demonstrations of varietal evaluations of wheat variety GJW-463, were conducted at 30 farmers' fields under 12 ha for three years, to demonstrate production potential and economic benefits of improved technologies. Study revealed that improved cultivation practices comprised under FLDs viz., recommended variety, seed rate, timely sowing resulted in increase in yield in wheat crop over the check plots. The improved technologies gave higher yields and recorded a mean yield of 30.06, 33.94 and 49.75 q/ha during the year 2018-19, 2019-20 and 2020-21, respectively which was 16.51, 6.06 and 12.75 percent higher compared to prevailing farmers practice. The technology gap was 37.40, 33.52 and 17.71 q/ha and extension gap was 4.26, 1.94 and 5.62 q/ha during the year 2018-19, 2019-20 and 2020-21, respectively.

TOT 12

Enhancing dairy farm profit by effective mastitis control measures under Farmer First Programme in South Gujarat

N. B. Patel [1], Durgga Rani V. [2] and A. P. Raval [3]

[1]Associate Research Scientist, LRS, KU, Navsari

[2] and [3]Assistant Professor, College of Veterinary Science and A. H., KU, Navsari

Email: nbpatel1978@kamdhenuuni.edu.in

ABSTRACT

Dairy farming is a lifeline for rural India, but the economic threat of mastitis, a common disease in dairy cattle, looms large. This study embarked on a comprehensive investigation to scrutinize the financial implications stemming from clinical mastitis in crossbred dairy cattle. The research was conducted in the adopted villages of Pathri, Chhesgam, and Hansapore, nestled within Navsari District., with a specific focus on evaluating the efficacy of mastitis control interventions, encompassing rubber mat bedding, mineral mixture supplementation, deworming, and teat dipping, all integrated into the Farmer First Programme. Treated cows exhibited an impressive boost in daily milk production, with an average of 8.04 kg/day/animal, compared to 7.35 kg/day/animal in the control group. The fat content in milk slightly increased from 4.32%

(control) to 4.41% (treatment), while the solid non-fat (SNF) content remained consistent. Animal hygiene scores improved significantly, with a reduction from 1.72 (control) to 1.57 (treatment). Lameness scores witnessed a remarkable drop from 2.39 (control) to 1.23 (treatment). Hock and knee injury scores also decreased, from 1.60 (control) to 1.47 (treatment). The treatment group exhibited fewer mastitis cases, with only 13 cases observed compared to 22 in the control group. Milk pH remained stable, with 6.61 (treatment) and 6.68 (control). Economically, while the interventions introduced higher daily costs (e.g., mineral supplements, rubber mats, teat dip cups), the considerable increase in milk production offset these expenses. The benefit-cost ratio (BCR) underscored the financial feasibility of mastitis control, with the treatment group achieving a BCR of 1:1.92. In conclusion, this study illuminates that a comprehensive approach, incorporating improved nutrition, enhanced hygiene practices, and comfortable bedding materials, can effectively control mastitis, leading to increased milk production and amplified profits for Indian dairy farmers. These findings underscore the vital importance of investing in mastitis control to enhance rural livelihoods and ensure the sustainability of the dairy sector.

TOT 13

Awareness and opinion of farmers about the technological traits of maize cultivar *GAYMH 1*

C. B. Damor[1] , G. D. Hadiya[2] and D. M. Rathod[3]

[1] and [2]Assistant Research Scientist, Agricultural Research Station, AAU, Derol, India

[3]Assistant Research Scientist, Main Maize Research Station, AAU, Godhra, India

Email: cbdamor@aau.in

ABSTRACT

The Anand Agricultural University, Anand produces quality seeds of various crops for the farming community every year. The investigation was conducted in the Panchmahals district. Panchmahals district comprises seven talukas out of these three talukas viz. Godhra, Sahera, and Morvahadaf were selected purposively. There are four villages were selected purposively. After the selection of villages, 10 maize cultivars GAYMH 1 from each village were selected purposively. The investigation was conducted in 2020-2021 on 120 randomly selected beneficiaries of Anubhav brand seed GAYMH 1 adopted farmers. The results revealed that slightly less than half (45.00 %) of GAYMH 1 farmers belong to the old age group, slightly less than half (46.67 %) of GAYMH 1 farmers had higher secondary to college and above level of education, majority (72.50 %) of GAYMH 1 farmers had experience above ten years, more than three-fifth (63.33 %) of the GAYMH 1 farmers had medium to a high level of extension contact, awareness about technological traits of maize cultivar (73.33 %) farmers are aware the GAYMH 1 is an early maturing variety, (65.83 %) aware about this GAYMH 1 variety is high yielding as compared to local verities, (61.67 %) GAYMH 1 variety has more number of grains whereas, opinion of the farmers regarding the technological traits of maize cultivar GAYMH 1 accessibility ranked first followed by visible ranked second, sustainability ranked third.

TOT 14

Exploring the correlation between dairy farmer knowledge and recommended animal husbandry practices in Rajkot district

Prajapati V. S., Jadav N. B. and Undhad S. V.
Krishi Vigyan Kendra, JAU, Pipalia
Email: drvijay87@gmail.com

ABSTRACT

The 18th livestock census highlights India's prominent position in global cattle and buffalo populations, with approximately 199.07 million cattle and 105 million buffaloes, constituting 14.0% and 56.7% of the world's respective counts. Over the past decade, India's milk production demonstrated a 3.77% compound annual growth rate, reaching an impressive 112.5 million tonnes in 2009-10 (GOI, 2010). Notably, buffalo contributed the most to this milk output, contributing about 59.2 million tonnes, followed by crossbred cows (25.3 million tonnes) and indigenous cows (22.4 million tonnes). In Rajkot district of the Saurashtra Region, animal husbandry initiatives spearheaded by DRDA, District Panchayat, and the Dairy sector are dedicated to enhancing animal welfare. These efforts encompass diverse activities and integrated farming systems to uplift farmer livelihoods. The district boasts substantial populations of 273,401 cows, 345,901 buffaloes, and 396,385 sheep and goats. Against this backdrop, our study aims to illuminate the dairy animal management practices prevalent among owners in Rajkot district. The primary objective is to explore the nexus between dairy farmer profiles and their knowledge levels concerning recommended animal husbandry practices. The investigation, conducted within the operational ambit of KVK, encompassed 80 dairy farmers as respondents. Our findings unveil a noteworthy correlation between variables such as age, education, annual income, social participation, dairying experience, herd size, and milk yield. These factors are highly significant indicators of dairy farmers' familiarity with recommended animal husbandry practices. The positive and statistically significant attributes among dairy farmers underline the effective role of extension personnel in disseminating and transferring these recommended practices.

TOT 15

Profile of dairy farmers in Navsari district and their knowledge about zoonotic diseases

Durgga Rani V.[1], R. S. Ghasura [2], Deepti Nayak[3] and J. B. Dobariya[4]
[1] and [2]Assistant Professor, College of Veterinary Science and A. H., KU, Navsari
[3]Veterinary Officer, College of Veterinary Science and A.H., KU, Navsari
[4]Scientist, Extension Education, KVK, NAU, Waghai
Email: durggaraniv21@kamdhenuuni.edu.in

ABSTRACT

This study aimed to evaluate the profile and knowledge of dairy farmers in Navsari district, South Gujarat, regarding zoonotic diseases. The findings from this study, which encompassed data collected from 100 dairy farmers across five villages in Chikhli taluka of Navsari district, revealed valuable insights. It was observed that majority of the respondents fell within the middle-aged category (93.00%), had at least secondary level of education (56.00%), and possessed 5 to 10 years of experience in dairy farming (77.00%). Most of the dairy farmers had small and marginal land holdings (76.00%) and earned up to 1 lakh rupees annually from their dairy farming endeavours (83.00%). All the respondents were members of milk co-operative societies (100.00%). Regarding the knowledge of zoonotic diseases, the study revealed crucial information. Dairy farmers exhibited high levels of awareness, all the respondents acknowledged the potential transmission of diseases from cattle/buffalo to dairy farmers, and 93.00% recognised the reverse transmission possibility. Further, their knowledge extended to the routes of transmission, with inhalation

(85.00%) and wounds (85.00%) being identified as key pathways. The respondents exhibited significant awareness about various zoonotic diseases, such as Brucellosis (98.00%), Anthrax (95.00%), Leptospirosis (90.00%), and COVID-19 (89.00%), along with associated details about each disease. This research emphasized the vital role of observation and data collection in understanding the demographics and knowledge levels of dairy farmers, highlighting their potential vulnerabilities to zoonotic diseases. These findings hold considerable importance for developing targeted interventions and educational programs to enhance the health and well-being of both dairy farmers and their livestock, ultimately contributing to improved food safety and public health.

TOT 16

Empowering farmers: Novel strategies for technology adoption in Indian agriculture

K. L. Chaudhary, Umang B. Patel, A. P. Chaudhary and D. H. Chaudhary
Navsari Agricultural University, Navsari, Gujarat
Email: kalpeshjudal@gmail.com

ABSTRACT

Agriculture plays a pivotal role in sustaining global food security and economic development. "Innovative Models of Technology Transfer in Agriculture are crucial for addressing the challenges of climate change, population growth, and resource scarcity. Emerging agricultural technology transfer models include "Digital Extension Services," which use smart phones and digital platforms to provide farmers with real-time information on weather, pest control, market trends and best practices, enhancing productivity and resilience. Furthermore, "Farmers' Cooperatives and Agribusiness Hubs" enable collective resource pooling, knowledge sharing, and access to advanced technologies like precision equipment and drones. Another promising model is "Public-Private Partnerships (PPPs)" involve collaboration between governments, research institutions, and private firms to develop and promote innovative agricultural technologies, accelerating their adoption by combining public support with private sector innovation. These models empower farmers with the knowledge and tools needed to adapt to evolving challenges, ultimately driving sustainable agricultural development and food security worldwide.

TOT 17

Pre-calving management approaches implemented by buffalo dairy farmers for calf rearing: A study in South Gujarat's Tapi district

Parmar, S. T[1]., Patel, N. B[2] and Durgga Rani V.[3]
[1]Veterinary Officer, College of Veterinary Science and A.H., KU, Navsari
[2]Associate Research Scientist, Livestock Research Station, KU, Navsari
[3]Assistant Professor & HoD, College of Veterinary Science and A.H., KU, Navsari
Email: sanjay_vets@kamdhenuuni.edu.in

ABSTRACT

This research paper investigates the pre-calving care practices adopted by dairy farmers for buffalo calf rearing in South Gujarat's Tapi district. The study focuses on understanding the various management techniques utilized by farmers to ensure the well-being and reproductive health of the dam, ultimately leading to healthier offspring. A mixed-methods approach, including surveys and interviews, was employed to gather data from a representative sample of dairy farmers in the region. The study emphasizes the importance of pre-calving care and its impact on overall productivity and profitability in buffalo calf rearing. The majority (72.10%) of dairy farmers fed concentrate feed as an additional ration to their pregnant animals. Only 15.00% of dairy farmers vaccinated and 27.90% dewormed their pregnant animals in the last trimester. Furthermore, only 37.90 percent of dairy farmers sought veterinary assistance at the time of calving, and merely 14.30%

had a calving pen. In addition, only 10.70% of the farmers had separate prepartum shelters for buffaloes and heifers. Approximately 27.10% of the farmers dried off pregnant animals 60 days before calving. Regarding the staff responsible for the prepartum period, 97.10 percent of dairy farmers engaged in various activities, while only 2.90 percent were exclusively involved in prepartum and calving activities. Moreover, only 1.40 percent of dairy farmers observed their pregnant animals fewer than two times a day, 0.70 percent observed them three times a day, and 97.90 percent monitored their pregnant animals more than four times a day. The above findings shed light on common practices, challenges faced, and areas for improvement in pre-calving management, offering valuable insights for dairy farmers, researchers, and policymakers.

TOT 18

Adoption level of improved sesame production technology and its relationship with independent variables in Banda district of Bundelkhand region

Rishabh Yadav, Pankaj Kumar Ojha and Dheeraj Mishra
SVPUA&T, Meerut, Uttar Pradesh
Email: rishabh123yadavcsa@gmail.com

ABSTRACT

Increased productivity and profitability can be achieved by Indian sesame farmers through the adoption of improved agricultural practices. It is anticipated that these enhanced methods could potentially raise sesame production output by 20–30%. Given India's substantial role as a global exporter of sesame seeds, the adoption of these superior practices not only ensures consistent quality but also aligns with international standards, effectively meeting global demand. This study was conducted in Banda district to assess the extent to which farmers have adopted new technology to enhance sesame production. It also explores the relationship between this adoption and various independent factors. Notably, the research findings reveal that in the surveyed area, about 20% of respondents have shown a high adoption rate of improved sesame production technology, while 68% exhibit moderate adoption levels. Furthermore, the study identifies a significant disparity in weed management practices between beneficiaries and non-beneficiaries. Additionally, positive correlations emerge between adoption levels and several independent variables, including age, income, landholding, occupation, education, social participation, housing, mass media exposure, training, and extension participation. Overall, this research provides valuable insights into the potential of modern agricultural methods to transform Indian sesame farming, ultimately contributing to national food security and enhancing global competitiveness.

TOT 19

Constraints and suggestions of the cotton seed producer farmers regarding various aspects of cotton seed production

K. V. Mashaliya[1], R. R. Prajapati[2] and S. G. Rathava[3]
[1] and [3]P. G. student, Dept. of Agril. Extension and Communication, SDAU, Gujarat
[2]Associate Professor, COA, Tharad, SDAU, Gujarat
Email: kishanmashaliya01@gmail.com

ABSTRACT

The study was carried out in Sabarkantha district of Gujarat state. Ex-post facto research design and multiple random sampling techniques was followed for selection of the cotton seed producer farmers. Thus, total 240 cotton seed producer farmers were selected as sample size. Cotton seed producer farmers are confronting many constraints in the cotton seed production enterprise. They were asked to express the constraints they faced in cotton seed production enterprise. The data were collected through personal interview. Frequency and per cent of each constraint and suggestions reported by them were computed and

ranked accordingly. Result revealed that the farmers faced fourteen constraints in cotton seed production enterprise. Important constraints faced by majority of the farmers were; infection of pink bollworms cause "rosetted-bloom" and "rosetted flower" (95.83%), scientific practices like emasculation, pollination, hand picking of rosette flowers, clipping of terminal shoots and removed of pest-disease affected balls are time consuming, laborious and expensive (87.50%), scarcity of skilled labour at time of emasculation and pollination (83.75%). Farmers were asked to give suggestions to overcome the constraints they faced in cotton seed production. Important suggestions given by majority of them were; organization of adequate trainings and demonstrations on Integrated Pest Management (IPM) and Integrated Disease Management (IDM) for effective plant protection measures in cotton seed production (87.50%), cotton seed production should be cover under crop insurance (83.75%), Government intervention for making strict laws to make legal contracts and remunerative price of cotton seed proper enforcement of contract farming laws for better price realization in cotton seed production (82.50%).

TOT 20

Constraints experienced by the inland fish farmers

P. C. Patel, K. G. Khadayata and S. A. Sipai
Directorate of Extension Education, Anand Agricultural University, Anand
Email: pcpatel@aau.in

ABSTRACT

The study was conducted in the Anand districts of middle Gujarat State, with 150 randomly selected inland fish farmers as respondents. In light of the objectives, the interview schedule was prepared and respondents were interviewed. The study reveals that important constraints experienced by the inland fish farmers were: accessibility of high-quality fish seeds of several types and insufficient expertise in fish processing and major important suggestions endorsed by the inland fish farmers were insurance must be offered in high mortality situations and fisheries cooperatives should be established at the block level.

TOT 21

Constraints experienced by trainees and non-trainees dairy farmers in adoption of scientific dairy farming

Nande M. P.[1], Ashwar B. K.[2] and Patel D. V.[3]
[1]Assistant Professor, Department of Veterinary Extension, Shirwal
[2]Professor & Head, Department of Veterinary Extension, KU, Dantiwada
[3]Assistant Professor, College of Polytechnic, KU, Dantiwada
Email: drmilinda@yahoo.co.in

ABSTRACT

This study was undertaken to assess constraints experienced by trainees and non-trainees dairy farmers on promotion of scientific dairy farming in North Gujarat. The data were collected from three selected KVKs, total 300 respondents were selected, out of it 150 trainees, who were imparted training on dairy farming under KVK and 150 non-trainees selected from same village to generate comparison group. Constraints had categorized into four major categories *i,e.* Personal, Economic, Technical and Institutional perceived by trainees and non-trainees dairy farmers for adoption of scientific dairy farming practices. Data revealed that majority of trainees and non-trainees respondents perceived most serious personal and economic constraints *i,e.* 'non-availability of sufficient time to perform activity other than agriculture and dairy farming' (Mean Score = 1), 'high cost of animal' (Mean Score 1) and 'high cost of concentrate feed' (Mean Score 0.96). As regard to institutional constraints trainees had major problem of 'lack of training facilities' (Mean Score 0.73) whereas non-trainees had major problem of 'no awareness and access to government scheme' (Mean Score 0.73). In technical constraints 'lack of knowledge about recommended practices of animal husbandry' (78.66

per cent) was major technical constraints of non-trainees whereas 'low productivity of dairy animals (73.33 per cent) was major technical constraints faced by trainee dairy farmers.

TOT 22

Constraints faced by dairy farmers in adoption of deworming and vaccination in buffalo

B. M. Rathavi[1], M. R. Patel[2] and M. Maheswaran[3]

[1]PG scholar, Dept. of Agril. Extension & Communication, AAU, Anand, Gujarat

[2]Assoc. Professor, Dept. of Agril. Extension & Communication, AAU, Anand

[3]Assistant Professor, Dept. of Agril. Extension Education, KAU, Kerala.

Email: newsmrp@gmail.com

ABSTRACT

Livestock rearing is an integral part of agriculture in India as well as many developing countries since centuries. The Indian dairy industry has made remarkable progress in the last three decades with unprecedented growth in milk production. A study of major constraints faced by dairy farmers about deworming and vaccination in buffalo was carried out in district of Anand, Gujarat. Sample size of the present study was 100 dairy farmers doing deworming and vaccination in buffalo. The major constraints faced by dairy farmers were; lack of knowledge of common contagious diseases, lack of awareness and knowledge about the importance of deworming and vaccination and lack of staff at veterinary dispensaries as well as primary veterinary treatment centers. The major suggestions given by dairy farmers were; deworming and vaccination facilities should be provided by the Government at the proper time, regular visits of veterinary doctor, livestock inspector and extension specialist should be made available for deworming and vaccination and provisions should be made for a regular training to livestock owners.

TOT 23

Constraints faced by the beneficiaries in the adoption of Brinjal cultivar GAB 6

P. C. Patel, S. A. Sipai and J. D. Desai

Assistant Extension Educationist

Directorate of Extension Education, AAU, Anand

Email: pcpatel@aau.in

ABSTRACT

This genotype is developed from the cross Doli 5 X GOB1 through the pedigree method of selection during 2006-07 to 2012-13. This genotype AB 13-03 was tested in PET I during 2013-14 and onwards in different trials over locations in the state from the year 2014-15 to 2018-19. This genotype was also contributed to AICRP (VC) since 2014 for national testing. The major districts of Gujarat growing brinjal are Anand, Vadodara, Kheda, Surat, Mehsana, Banasakantha, Navsari, Dahod, Junagadh, Bhavnagar, Tapi, Surendranagar, Rajkot, Amreli and Gandhinagar occupied more than 73% area and more than 75% production of total brinjal crop. In Middle Gujarat, the brinjal crop occupied about 43.36% area of Gujarat contributing 44.10% share in production during the year 2020-21. The study was conducted in the year 2021 with a purposive sample of 78 beneficiaries. The findings revealed that and the major constraints faced by the beneficiaries were Seed of GAB 6 variety is not available in sufficient quantity (24.36 %), Seed of GAB 6 variety is not available on time (23.08 %), Farmers do not have enough information about the package of practices of GAB 6 variety (16.67 %) and major suggestion were literature should also be provided along with seeds of GAB 6 variety(64.10 %), More demonstrations of GAB 6 variety should be organized for greater awareness among the farmers (53.85 %).

TOT 24

Constraints faced by the farmers in adoption of Good Agriculture Practices (GAPs)

P. B. Chaudhary, S. P. Pandya and H. A. Chaudhari
Department of Agricultural Extension and Communication
CPCA, S. D. Agricultural University, Sardarkrushinagar
Email : pradipcp8@gmail.com

ABSTRACT

The concept of Good Agriculture Practices (GAPs) has evolved in recent years in the context of a rapidly changing and globalizing food economy and as a result of the concerns and commitments of a wide range of stakeholders about food production and security, food safety and quality and the environmental sustainability of agriculture. GAPs apply recommendations and available knowledge to addressing environmental, economic and social sustainability for on-farm production and post-production processes resulting in safe and healthy food and non-food agricultural products. A study was conducted in North Gujarat. Banaskantha and Sabarkantha districts were selected randomly from six districts of the North Gujarat. Four talukas were randomly selected from each district. Three villages from each taluka were selected randomly. Thus, total 240 respondents have been selected for the study and were interviewed with a structural pre-tested interview schedule. Ex-post facto research design was followed for carrying out the study. The major constraints faced by the carrot growers in adoption of Good Agriculture Practices were; high initial cost (92.50 %), farmers getting less price of product as compare to MSP (90.41 %), risk in adoption of new technology as compare to traditional (88.75 %), shortage of labour (84.58 %), uneven and erratic rainfall (83.75 %), inadequate information (78.75 %), unavailability of seeds of latest high yielding varieties (HYV) (70.00 %), lack of appropriate technologies (69.58 %), procedure of seed treatment is very laborious (68.75 %), high cost of improved farm machinery (67.91 %), improved/ latest farm equipments are expensive (60.83 %) and location specific scientific technology cannot perform in every location (53.33 %).

TOT 25

Constraints faced by tribal farmers in Bt. Cotton seed production

Patel V. M.[1], J. J. Mistry[2] and J. K. Patel[3]
[1]Assistant Research Scientist, Wheat Research Station, SDAU, Vijapur
[2]Senior Scientist & Head, KVK, SDAU, Khedbrahma
[3]Assistant Professor, College of Horticulture, SDAU, Jagudan
Email: dssvpatel@gmail.com

ABSTRACT

Cotton is known as "king of fiber". The crop has its importance in agriculture as well as industrial economy. It is known as white gold. Due to its industrial demand the crop gives higher returns to the farmers. The present study was conducted in Sabarkantha district. The maximum number of the tribal farmers of Khedbrahma and Poshina are taking cotton seed production on their field. Thus two tribal talukas, *viz;* Khedbrahma and Poshina were selected purposively. Six villages from each selected taluka were selected randomly. From each selected village 25 Bt. cotton tribal seed producers were selected randomly. Thus from 12 selected villages, 300 Bt. cotton seed producers were the sample of study. The study revealed that the cent per cent of Bt. cotton seed producers faced the constraints *viz;* the rate of cotton seed is very low as compared to increase in cost of inputs, the payment of cotton seed is delayed by 4 to 6 months, the cost of parent seed is very high, the transportation expenses are borne by the cotton seed producing farmers, all family are engaged in cotton seed production but do not get remunerative return, the rate of cotton seed has been decided by the concern seed producer dealer. Whereas, other important constraints faced by Bt. cotton seed producers were; farmers do not have choice of variety for cotton seed production, lack of knowledge about variety of cotton seed production and lack of technical knowledge regarding control of disease and pest.

TOT 26

Effect of *Azolla* supplementation on milk yield in buffaloes: A field study

V. K. Patel, P. B. Singh, D. A. Sadrasaniya, C. K. Desai and D. B. Patel
Krushi Vigyan Kendra, S. D. Agricultural University, Tharad
Email: drvikrampatel2012@gmail.com

ABSTRACT

Productivity of dairy animals largely depends on proper feeding management. For this, dairy animals should offered balanced diet which contain proteins, vitamins, minerals in proper proportion for efficient milk production. Under this context, Azolla can be one of the best alternatives. It has ability to grow faster with the minimum production cost. Azolla is rich in protein along with mineral, vitamins, antioxidants that is contributing to better growth and production of dairy animals. Azolla is a free floating, rapidly growing aquatic fern on water surface. It has enormous potential as a livestock feed due to its high content of protein, essential amino acids, vitamins and minerals. The scientists of Krishi Vigyan Kendra, SDAU, Tharad introduced *azolla* cultivation in the district by demonstration conducted at farmers' field. Azolla production units were established in five adopted villages under front line demonstration. For present study, 20 lactating buffalo of 2nd and 3rd lactation at mid lactation were selected and divided into two control and treatment groups. The feeding trial lasted for 90 days. During trial daily milk yield, fat percentage and physical health status of animal were recorded and found the milk yield and fat percentage was significantly higher in treatment group.

TOT 27

Factor associated with attitude of farmers towards Anand agricultural university

Ravikumar Chaudhari[1], J. B. Patel[2] and J. K. Patel[3]
[1]Research Associate, Extension Education Institute (EEI), AAU Campus, Anand
[2]Professor and Head, Dept. of Agril. Extension & Communication, AAU, Anand
[3]Director, Extension Education Institute (EEI), AAU Campus, Anand
Email: ravichaudhari1627@gmail.com

ABSTRACT

Anand Agricultural University is one of the premier agricultural universities in India with the aim of providing educational, research, and extension support to the farming community. The university aims to enhance the prosperity of rural society through scientific knowledge and innovation. The study was conducted within the jurisdiction of AAU with a sample size of 240 farmers, found that majority of the farmers (79.58 %) had a favorable to strongly favorable attitude towards the university and all categories of farmers had identical attitudes towards Anand Agricultural University which implies that AAU has made significant contribution for the welfare of farmers since its inceptions.

TOT 28

Feedback of beneficiaries about brinjal cultivar GAB 6

P. C. Patel, S. A. Sipai and J. D. Desai
Assistant Extension Educationist
Directorate of Extension Education, AAU, Anand
Email: pcpatel@aau.in

ABSTRACT

Brinjal (*Solanum melongena* L.) is one of the most common tropical vegetables grown in India. A large number of cultivars differing in size, shape and color of fruits are grown in India. Brinjal is considered a native to India where the major domestication of cultivars occurred. Among brinjal producers, China, India, Japan

and Turkey are the four major countries. China is the world's top eggplant grower, accounting for more than half of world acreage and India stands second, with about one-quarter of the world's total production. The study was conducted in the year 2021 with a purposive sample of 78 beneficiaries. The study revealed that majority of beneficiaries responded that brinjal cultivar GAB 6 is triable (94.87 %), acceptable (93.59 %), the result of the variety is visible (85.90 %), the variety is compatible (76.92 %) and the variety is relatively advantageous than other local cultivars of Brinjal (71.79 %).

TOT 29

Feedback of beneficiaries about the technological traits of Brinjal cultivar GAB 6

P. C. Patel[1], S. A. Sipai[2] and M. M. Pandya[3]

[1] and [2]Asst. Extension Educationist, Directorate of Extension Education, AAU, Anand

[3]Asst. Research Scientist, Main Vegetable Research Station, AAU, Anand

Email: pcpatel@aau.in

ABSTRACT

In India, Gujarat contributes 11.14% shares of brinjal in total production. Gujarat secures the third position for production in India after West Bengal and Orissa. This genotype is developed from the cross Doli 5 X GOB1 through the pedigree method of selection during 2006-07 to 2012-13. This genotype AB 13-03 was tested in PET I during 2013-14 and onwards in different trials over locations in the state from the year 2014-15 to 2018-19. This genotype was also contributed to AICRP (VC) since 2014 for national testing. The study was conducted in the year 2021. A list was obtained from Main Vegetable Research Station, AAU, Anand and from that 78 beneficiaries were selected purposively. The data was collected and analyzed in light of the objectives by using appropriate statistical tools. From the study, important feedback given by beneficiaries were GAB 6 variety has enough plant height (96.15 %), GAB 6 variety has more number of fruits per plant (96.15 %), GAB 6-variety has dark pink fruit skin colour with strong glossiness (94.87 %), GAB 6 variety has medium size of fruits (93.59 %), GAB 6 variety yields more than other local varieties (92.31 %), respectively.

TOT 30

Impact of front line demonstrations on boosting productivity of Coriander

Baraiya K. P.[1], Baraiya A. K.[2], Savaliya A. V.[3] and Ambaliya N. D.[4]

[1]Senior Scientist & Head, Krishi Vigyan Kendra, JAU, Jamnagar

[2] and [3]Scientist, Krishi Vigyan Kendra, JAU, Jamnagar

[4]Technical Assistant, Krishi Vigyan Kendra, JAU, Jamnagar

Email: kpbaraiya@gmail.com

ABSTRACT

Front Line Demonstration conducted at Krishi Vigyan Kendra, Jamnagar for the purpose of enhancement of the yield performance and achieves the potential yield of the coriander crop in Rabi season during the year 2017-18 to 2021-22. Farmers of Jamnagar and Devbhui Dwarka district were provided guidance and conducted FLD on their own field at different villages during the study period. Data recorded for the yield, and worked out technology gap, extension gap, technology index and economics along with benefit cost ratio. The five-year data revealed that the demonstrated plot having higher yield (14.68 q/ha) as compare to local check (13.20 q/ha). Yield increase in demonstration plot (11.26%) as compare to farmers' practices. In accordance to the extension gap, technology gap and technology index noted 1.48, 1.32 and 8.25, respectively. Net return recorded and benefit cost ratio in demonstrated plot Rs.75311 per hectare 2.24 and in check plot Rs.62983 per hectare 1.80, respectively. The respondent satisfaction index (RSI) revealed that majority of respondent farmers expressed high (61.43%) level of satisfaction about Front Line Demonstration. Unavailability of improved seed varieties of coriander in relation to climate change was found to be most confronting constraint as perceived by them and ranked I.

TOT 31

Impact of cluster frontline demonstrations on gram in Tapi district of South Gujarat

C. D. Pandya, A. J. Dhodia and K. N. Rana
Krishi Vigyan Kendra, NAU, Vyara
Email: akshaydhara@nau.in

ABSRACT

Tapi is basically a forest dominated rainfed area with high rainfall. Tapi district comes under South Gujarat Heavy Rainfall Zone–I & II. The hilly area consists shallow soil depth. So, even with high rainfall water conservation in pond, river, well, *etc* is limited in most area and by that way low availability of ground water. In fact, area below Ukai dam is well benefited with canal irrigation. So, in major area, Tapi faced water shortage during post Rabi season and summer season. In this situation, gram used to cultivate by farmer in *Rabi* season. Keeping in view, KVK, Tapi arranged cluster frontline demonstrations on integrated crop management in gram (GG-5) in 40 ha covering 100 numbers of farmers in two blocks of Tapi district during *Rabi* 2019 to 2021. The present study impact of cluster frontline demonstrations on gram in Tapi district of south Gujarat was carried out and findout the impact of CFLDs on yield, economics and adoption level of gram production technologies. The study was conducted in Songadh and Dolvan block from Tapi district. Total 100 farmers who were the beneficiaries of CFLDs on Gram (GG-5) conducted by KVK-Tapi were selected purposively for the study. Cluster frontline demonstrations of gram (GG-5) had positive impact on yield, economics and various production technology of Gram cultivation. It is due to adoption of Scientific practices i.e. Land preparation and application of 10 T FYM, Improved variety, Seed treatment, Seed rate, Moisture conservation practices, sowing time and spacing, Integrated pest & disease management, Nipping in Gram, Weed management and Fertilizer management.

TOT 32

Impact of front line demonstrations on productivity of cumin

Baraiya A. K., Baraiya K. P., Savaliya A. V. and Ambaliya N. D.
KVK, Junagadh Agricultural University, Jamnagar
Email: anjana1baraiya@gmail.com

ABSTRACT

The present study was conducted under ATIC scheme during 2017-18 to 2021-22 on impact assessment of Frontline Demonstrations on use of technology and productivity enhancement of cumin was conducted in different villages of Jamnagar and Devbhumi dwarka District by KVK, Jamnagar. Observation on yield attributes of both demonstrations and farmer practices were recorded and per cent yield enhancement, technology gap, extension gap, technology index, were analyzed. The five-year data revealed that average yield of demonstration plots was obtained 8.214 q/ha over the farmer practices (7.38 q/ha) and there in an increase in average yield by 11.22 per cent. The net returns and B:C ratio on demonstration plot were higher Rs.127111/ha and 2.84, respectively as compared to farmers' practices Rs.66823 and 1.47. The respondent satisfaction index (RSI) revealed that majority of respondent farmers expressed high (59.39 %) level of satisfaction about Front Line Demonstration. The study suggests that for strengthening linkages with line department and converging the demonstration with Government schemes for large scale adoption of farmers' fields. This can be a good option for enhancing farmers' income.

TOT 33

Impact of MPKV released Sugarcane variety *Phule -265* in salinity struck areas : A case study of S. D. S. S. S. K. Limited Shirol, Kolhapur

Patil, S. S.[1] Tarde V. J.[2] and Heganna S. S[3].

[1]Senior Research Assistant, RCSM, College of Agriculture, Kolhapur

[2]Professor of Agricultural Extension, College of Agriculture, Pune

[3]Chief Agril. Officer, Shri Datta Shetkari Sahkari Sakhar Karkhana, Shirol

Email: hiradeep183@rediffmail.com

ABSTRACT

Recently environmental degradation is a burning issue, it covers water, soil, forest and air. Among these, soils salinisation is an important determinant of environmental degradation in India. About 187.8 million hectares (approximately 57%) out of 328.27 million hectares of land areas has been degraded in the country. In Shirol taluka 9402 hectares land have been salinised and adversely affected its agricultural economy. Area under sugarcane in salinity affected areas decreased by 22 percent. Production was decreased by 51 percent and yield per hectare was by 37.77 percent. A sugarcane variety CO-M-0265- also known as Phule 265, a salt tolerant varirty released by MPKV Rahuri in 2007, came up as a boon to this area with 20 to 40 per cent higher yield and recovery over prevalent popular varieties. *Shri Datta Shetakari Sahkari Sakhar Karkhana*, a sugar factory from Shirol promoted this variety in its salinity struck catchment area. This study was conducted to assess the impact of this variety. Initially Phule 265 comprised only 3.81 per cent to total milled area, which increased up to 79.00 per cent of total milled cane in 2013 and 2014. With crushing, Phule-265 was having nearly 6.00 per cent of its share to total crushed cane in 2008-09, which increased significantly to over 80.00 per cent by 2013-14 reducing down share of another popular variety Co-86032 from 76.00 per cent to 19.00 per cent in 2012 and 2013. Phule-265 was giving consistent yield above 100 Mt/ha except year 2016-17. The gross income added by sugarcane variety per hectare was calculated by simple multiplication of the differed additional average yields recorded by Phule-265 variety to the rate declared by factory in that year. Over the period 2008-09 to 2016-17, Rs. 48.91 i.e. around 50 crore rupees value addition was made by Phule-265 in the catchment area of SDSSK, Shirol.

TOT 34

Investigating energy needs for dehydration of chickpeas

U. D. Dobariya[1], K. G. Vaja[2], A. D. Deshpande[3] and V. M. Modi[4]

[1] and [4] Assistant Professor, S. D. Agricultural University, Dantiwada

[2]Senior Research Assistant, CAET, Junagadh Agricultural University, Junagadh

[3]Principal, College of RE&EE, S. D. Agricultural University, Dantiwada

Email: umesh@sdau.edu.in

ABSTRACT

In this study, a nutritious legume called chickpeas was dried, and the use of both conventional and unconventional energy sources is examined. Solar energy is one of the more promising non-conventional energy sources and is used as an additional energy source in solar-assisted forced convection dryers. These dryers use additional heating systems to deliver controlled hot air and maximize the drying of chickpeas. The study focuses on drying cooked and soaked chickpeas at various drying air temperatures and air velocities (from 0.25 m/s to 1.00 m/s) ranging from 50°C to 80°C. The Exponential model and Page's model were two mathematical models used to characterize the drying behavior. The better fit of Page's model with the experimental data led to the conclusion that it was more suitable. Arrhenius and power models were used to analyze the drying rate constant (k) and its relation to drying air conditions (temperature and velocity). The research discovered that air temperature rather than air velocity significantly affected the drying rate constant. For cooked and soaked chickpeas, the Arrhenius model produced precise parameter values,

demonstrating a better fit. The research calculated the amount of energy needed to lower the initial moisture content of chickpeas from 67% when cooked and 58% when soaked to 7%. Depending on the drying conditions, the energy requirements per mass of water removed ranged from 11.28 MJ/kg water to 66.09 MJ/kg water for soaked chickpeas to 12.86 MJ/kg water to 66.97 MJ/kg water for cooked chickpeas. For cooked and soaked chickpeas, the ideal drying conditions were found to be between 50°C and 60°C, with good results being attained at 70°C. In conclusion, this study emphasizes the importance of alternative energy sources, notably solar energy, in the process of drying chickpeas. It emphasizes how well Page's model works and how drying air temperature affects the drying rate constant. It also offers perceptions into energy effectiveness and dried chickpea quality, offering important information for food drying technologies.

TOT 35

Impact of Krishi Vigyan Kendra on promotion of scientific dairy farming in North Gujarat

Nande M. P.[1], Ashwar B. K.[2] and Patel D. V.[3]

[1]Assistant Professor, Department of Veterinary Extension, Shirwal

[2]Professor & Head, Department of Veterinary Extension, KU, Dantiwada

[3]Assistant Professor, College of Polytechnic, KU, Dantiwada

Email: drmilinda@yahoo.co.in

ABSTRACT

This study was undertaken to assess the impact of Krishi Vigyan Kendra on promotion of scientific dairy farming in North Gujarat. The data were collected from three selected KVKs, total 300 respondents were selected, out of it 150 trainees, who were imparted training on dairy farming under KVK and 150 non-trainees selected from same village to generate comparison group. The study revealed that majority of trainees and non-trainees dairy farmers belonged to middle age, education up to primary level, OBC caste, joint family, semi-medium land holding, medium herd size possession, agriculture and animal husbandry as a main occupation, medium income from dairy farming and medium annual family income. Trainees' dairy farmers had significantly high difference in herd size, annual income from dairy farming, and annual family income than non-trainees. Majority of trainees and non-trainees had medium mass media exposure, extension contact, utilization of informal sources, economic motivation, scientific orientation, risk orientation, attitude towards dairy farming, knowledge and adoption of scientific dairy farming. Trainees had found significantly high mass media exposure, more favourable attitude towards dairy farming, knowledge level of scientific dairy farming and adoption of scientific dairy farming practices. Statistically, family size, herd size, income from dairy farming, annual family income, mass media exposure, informal sources of information, economic motivation, scientific orientation, attitude, and knowledge had positive and significant correlation with adoption of scientific dairy farming practices. Training participation had exerted positive and significant impact on adoption of scientific dairy farming practices. Knowledge exerted most positive direct and indirect effects on adoption of scientific dairy farming practices.

TOT 36

Knowledge of dairy farmers about subclincal mastitis in Vadodara district

N. Bhabhor[1], B. H. Panchal[2] and V. D. Rathva[3]

Sheth D. M. Polytechnic in Horticulture, Model Farm, Vadodara

Email: ishwar.vet@gmail.com

ABSTRACT

Subclinical mastitis (SCM) is of great economic importance to dairy farmers because it results in reductions in milk yield and undesirable changes in the milk's composition as well as increased costs associated with control strategies. In Sub-clinical mastitis (SCM) there are no visible abnormalities in udder tissues except an elevated Somatic Cell Count (SCC). Half (50.67 %) of the dairy farmers had low level of

knowledge regarding SCM followed by medium and high knowledge, majority (96.00 %) of dairy farmers possessed knowledge about occurrences of subclinical mastitis in dairy animals. Majority of dairy farmers had knowledge about microorganisms (89.33 %) cause SCM followed by teat injury (60.00 %) and malnutrition (11.33 %). Only 2.00 per cent had knowledge about any screening test is used for detection of SCM. 86.33 per cent of dairy farmers use knuckling method of milking followed by (13.33 %) full hand milking method. No one use stripping and milking machine as milking method. More than half (54.00 %) dairy farmers perform milking in open space and 46.00 per cent perform milking in stanchion bran. Nearly half (47.33 %) of dairy farmers have kaccha floor as bedding material for livestock followed by, concrete floor (40.00 %) and floor with rubber mat (12.67 %), respectively. Great majority (98.67 %) of dairy farmers follow semi-intensive type of dairy farmers. 70.00 per cent of dairy farmers wash animal shed when need to clean in day whereas (24. 67 per cent) cleans once in day and very few (5. 33 per cent) clean twice in a day.

TOT 37

Knowledge of FLDs farmers and fellow farmers about groundnut production technology

D. J. Dadhaniya[1], H. C. Chhodavadia[2] and N. M. Pithiya[3]

[1]M. Sc. Student, Dept. of Agricultural Extension, CoA, JAU, Junagadh

[2]Associate Director of Extension Education, Office of DEE, JAU, Junagadh

[3]Agriculture Officer, Department of Agronomy, CoA, JAU, Junagadh

Email: dadhaniyadharati@gmail.com

ABSTRACT

Knowledge of the recommended technologies is a prerequisite to adoption process. The adoption of any technology depends on the individual development and acceptance of modern agricultural technology is the foremost important for increasing crop production. This is possible through the demonstration as it is an important and appropriate extension method, which make it possible to disseminate technology to user farmers and field day played important role for horizontal spread of technology. The study was conducted in Saurashtra region with groundnut growers 60 FLDs farmers and 120 fellow farmers. The study revealed that 66.67 per cent of the FLDs farmers had medium level of knowledge about groundnut production technology, while 21.66 per cent and 11.67 per cent of the FLDs farmers had high and low level of knowledge about groundnut production technology, respectively. While in case of fellow farmers, 58.33 per cent of the fellow farmers had medium level of knowledge about groundnut production technology, while 25.00 per cent and 16.67 per cent of the fellow farmers had low and high level of knowledge about groundnut production technology, respectively. The several profile characteristics of FLDs farmers education, training received, size of land holding, social participation, annual income, source of information, extension participation, innovativeness, scientific orientation and yield index had positive and significant relationship with their level of knowledge about groundnut production technology. While in case of fellow farmers education, training received, social participation, annual income, source of information, extension participation, innovativeness and yield index had positive and significant relationship with their level of knowledge about groundnut production technology.

TOT 38

Knowledge of tribal farmers regarding recommended fennel production technology

Himanshu Chaudhari, J. J. Mistry and P. B. Chaudhary

Department of Agricultural Extension and Communication

C P College of Agriculture, S D Agricultural University, Sardarkrushinagar

Email: charliechaudhari196@gmail.com

ABSTRACT

A survey study was conducted to acquire the first hand information on personal and socio-economic

characteristics and knowledge of tribal farmers regarding recommended fennel production technology in Banaskantha district of Gujarat state. Using purposive sampling technique, all tribal talukas *viz.,* Amirgadh and Danta were selected purposively from the Banaskantha district. Ten villages were selected randomly from each talukas having fennel cultivation. Thus, total twenty villages were selected. From each selected villages, six respondents were selected randomly making a sample of 120 respondents. The data were collected by personal interview technique through a structural schedule. In personal and socio-economic characteristics, majority of the tribal fennel growers (53.33%) were found in middle age group and majority of the tribal fennel growers (55.83%) were having primary to middle school education. Majority of the tribal fennel growers (47.50%) had up to 2.0 ha of land, 41.66 per cent of the tribal fennel growers had annual income between ₹ 50,001 to ₹ 1,00,000 and majority of the tribal fennel growers (63.34%) had membership in social organization. Majority of the tribal fennel growers (70.00%) were belonged to medium size of family, majority of the tribal fennel growers had medium level (66.66%) of information source and majority of the tribal fennel growers (65.00%) had medium level of extension participation. Majority of the tribal fennel growers (67.50%) possessed medium economic motivation, majority of the tribal fennel growers (63.33%) had medium scientific orientation. In knowledge of tribal farmers regarding recommended fennel production technology include majority of the tribal fennel growers (66.67%) were having medium level of knowledge regarding general aspect. The high knowledge level was observed in majority of respondents in stage of harvesting (87.50%), time of transplanting (81.66%), age of fennel seedling for transplanting (80.00%), hand weeding (74.16%), gap filling (65.00%), recommended variety (63.33%).

TOT 39

Management efficiency of the cotton seed producer farmers

K. V. Mashaliya[1], R. R. Prajapati[2] and S. G. Rathava[3]

[1] and [3]P. G. student, Dept. of Agril. Extension and Communication, CPCA, SDAU, Gujarat

[2]Associate Professor, COA, Tharad, SDAU, Gujarat

Email: kishanmashaliya01@gmail.com

ABSTRACT

The study was carried out in Sabarkantha district of Gujarat state. Ex-post facto research design and multiple random sampling techniques was followed for selection of the cotton seed producer farmers. Total 240 cotton seed producer farmers were selected as sample size. The data were collected through personal interview and then after it is compiled, tabulated and analyzed with the help of various appropriate statistical tools. For measurement of variables included in study, different scales and scoring techniques were used. In order to measure management efficiency of the cotton seed producer farmers, ten indicators *viz.,* knowledge about improved cultivation practices of hybrid cotton seed production, ability in planning, information seeking ability, ability in coordinating activities, adoption of scientific cotton seed production practices, ability to make rational decisions, ability to mobilize resources, attitude towards hybrid cotton seed production, efficient use of resources, competence in evaluation of situation. Management efficiency is a level of performance that plan, decision, coordinate and uses the optimum quantity of resources to create the greatest outputs. Result revealed that great majority (82.08%) of the cotton seed producer farmers had high level of overall management efficiency followed by 17.92 per cent of them had medium level of overall management efficiency. No cotton seed producer farmer had very low, low and very high level of overall management efficiency.

TOT 40

Multiple regression analysis of the selected independent variables with socio- techno-economic change

A. C. Jatapara, K. A. Thakkar and A. R. Deshpande
Department of Agricultural Extension and Communication
C. P. College of Agriculture, S D Agricultural University, Sardarkrushinagar
Email: alpeshjatapara@gmail.com

ABSTRACT

Correlation analysis only shows co-existence of association between two variables. This does not capture the interaction effect among variables. One variable is associated with other or is simultaneously depends on several others. Socio-techno-economic change was postulated as linear function of personal, socio-economic, communicational, and psychological variables. It is not affected by any of these factors taken in isolation but as a part of complex and interacting system. Based on this approach, the multiple regression analysis using liner model was carried out to find the combined effect of the independent variables in explaining the total variation in socio-techno-economic change. To assess this a study was conducted in Khedbrahma and Vijaynagar taluka of Sabarkantha district. Total 20 villages were randomly selected from 2 purposively selected talukas and 10 respondents were randomly selected from each village. Thus, total sample size was 200 farmers. In multiple regression analysis, 12 independent variables were fitted to explain the variation in socio-techno-economic change of the tribal farmers. And it can be observed that all the independent variables explained as much as 58.26 per cent of total variation in socio-techno-economic change among the respondents. The unexplained variation of 41.74 per cent may be due to the factors outside the scope of the study.

TOT 41

Multiple regression analysis of the selected independent variables with agricultural modernization

A. C. Jatapara, K. A. Thakkar and K. M. Parmar
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University, Sardarkrushinagar
Email: alpeshjatapara @gmail.com

ABSTRACT

Correlation analysis only shows co-existence of association between two variables. This does not capture the interaction effect among variables. One variable is associated with other or is simultaneously depends on several others. Agricultural modernization was postulated as linear function of personal, socio-economic, communicational, and psychological variables. It is not affected by any of these factors taken in isolation but as a part of complex and interacting system. Based on this approach, the multiple regression analysis using liner model was carried out to find the combined effect of the independent variables in explaining the total variation in agricultural modernization. To assess this a study was conducted in Khedbrahma and Vijaynagar taluka of Sabarkantha district. Total 20 villages were randomly selected from 2 purposively selected talukas and 10 respondents were randomly selected from each village. Thus, total sample size was 200 farmers. In multiple regression analysis, 12 independent variables were fitted to explain the variation in agricultural modernization of the tribal farmers. And it can be observed that all the independent variables explained as much as 67.40 per cent of total variation in agricultural modernization among the respondents. The unexplained variation 32.60 per cent may be due to the factors outside the scope of the study.

TOT 42

Productivity enhancement in Bt. Cotton through IPM technology

Savaliya A. V., Baraiya K. P. and Ambaliya N. D.
Krishi Vigyan Kendra, Junagadh Agricultural University, Jamnagar, Gujarat
Email: ankurv.savaliya@gmail.com

ABSTRACT

Krishi Vigyan Kendra, Jamnagar conducted Front Line Demonstration (FLD) in the farmer's field on Integrated Pest management (IPM) with special emphasis on pink bollworm in Bt. Cotton crop during *Kharif* season of 2019-20, 2020-21 and 2021-22. During the study, it was observed that Integrated Pest Management (IPM) practices recorded a mean yield of 16.3 q/ha which is 37 percent higher than obtained with farmer's practice (12.1 q/ha). Whereas mean technology and extension gap is 3.7 and 4.3, respectively. Similarly, technology index range is 13-23 percent. In IPM practices gave higher net return 57722 Rs/ha compare to farmers practice (41997 Rs/ha) thus net return increase (40 %) over farmer's practice. IPM technology gave higher benefit cost ratio (2.73) compare to farmer's practice (2.18). The productivity of cotton per unit area could be increased by adopting feasible scientific and sustainable management practices with a suitable variety. Considering the above facts, IPM demonstrations were carried out in a systematic and scientific manner on farmer's field to show the worth of an improved practices and convincing farming community about potentialities of improved production management technologies of cotton for further adoption by the farming community.

TOT 43

Profile of the inland fish farmers

P. C. Patel[1], J. K. Patel[2] and J. D. Desai[3]
[1]Assistant Extension Educationist, DoEE, AAU, Anand
[2]Director, EEI, AAU, Anand
[3]Assistant Extension Educationist, SSK, DoEE, AAU, Anand

ABSTRACT

The study was conducted in the Anand districts of middle Gujarat State, with 150 randomly selected inland fish farmers as respondents. In light of the objectives, the interview schedule was prepared and respondents were interviewed either at their homes or office. The study reveals that majority of the inland fish farmers belonged to the middle age group, having a primary level of education without membership in any organization and most of them were male and belonged to other backward classes having annual incomes ranging from Rs. 50,000 to Rs. 1,00,000 with pond size of up to 02.00 ha and had a medium level of mass media exposure, scientific orientation, deferred gratification and economic motivation and had a low level of fish farming experience with a very low level of extension participation and fish farming commitment and had a very high level of credit orientation.

TOT 44

Quality optimization of vitamin C rich ready-to-serve beverage from Aonla (Gooseberry)

Pompy Bora[1], Bikash Nagaria[2], Pallavi Deka[3] andDebasish Borah[4]
[1]Programme Assistant (C. Sc.), KVK Sonitpur, AAU, Napam
[2]Programme Assistant (C. Sc.), KVK Cachar, AAU, Arunachal
[3]Subject Matter Specialist, KVK Udalguri, AAU, Lalpool
[4]Senior Scientist and Head, KVK Udalguri, AAU, Lalpool
Email: borapompy86@gmail.com

ABSTRACT

Indian gooseberry (*Phyllanthus emblica*) commonly known as aonla is one of the oldest minor fruit and it has tremendous nutitional values, rich source of vitamins C (400-600mg/100g), antioxidants, pectin and

tannin. It is a "wonder fruit for health" because of its unique properties. Aonla is highly perishable in nature and therefore it is necessary to extend the shelf life of the nutri-rich fruits and by adopting good post harvesting practices. Hence on-farm trial on quality optimization of Vitamin C rich Ready-To-Serve beverage from Aonla was undertaken in Udalguri and Cachar district of Assam in the year 2021-22 with the objectives to develop RTS beverages using sugar, citric acid and water in amla juice (T1 10%, T2 12%, T3 14%) was developed. The physical property of the prioduct was attributed by sensory evaluation test using 30 panel judges. It was found that T3 got highest score in terms of colour, taste and aroma whereas T1 less score compared to T2. The cost benefit ratio of T3 was 3.53 which was more than T1 and T2. From the study it can be concluded that majority preferred T3 as compared to T1 and T2.

TOT 45

Relationship between profile of the inland fish farmers and their information seeking ability

P. H. Patel[1], J. K. Patel[2] and K. M. Mashaliya[3]

[1]Ph.D. scholar, Dept. of Agricultural Extension & Communication, AAU, Anand

[2]Director, Extension Education Institute, Anand Agricultural University, Anand

[3]Ph. D. scholar, Dept. of Agricultural Extension & Communication, SDAU

Email: patelpratik8396@gmail.com

ABSTRACT

The study was carried out in Anand district of Gujarat state with 150 randomly selected inland fish farmers. A pre-tested interview schedule was prepared in light of the objectives and respondents were interviewed either at their home or work place. Ex-post facto research design was used. For measurement of variables included in study, different scales and scoring techniques were used. The result designated that amongst the fifteen selected variables of the of inland fish farmers in the study annual income, participation in training, exposure to agricultural mass media, risk orientation, achievement motivation, scientific orientation, innovation proneness and self-confidence had establish positive and significant relationship with the information seeking ability of inland fish farmers, whereas education and social participation had establish negative and significant relationship with the information seeking ability of inland fish farmers and age, caste, contact with extension agency, pond size and economic motivation failed to show any significant influence on the information seeking ability of inland fish farmers.

TOT 46

Relationship between profile of the inland fish farmers and their knowledge regarding fish

P. H. Patel[1], J. K. Patel[2] and K. M. Mashaliya[3]

[1]Ph.D. scholar, Dept. of Agricultural Extension & Communication, AAU, Anand

[2]Director, Extension Education Institute, Anand Agricultural University, Anand

[3]Ph.D. scholar, Dept. of Agricultural Extension & Communication, SDAU

Email: patelpratik8396@gmail.com

ABSTRACT

The study was carried out in Anand district of Gujarat state with 150 randomly selected inland fish farmers. A pre-tested interview schedule was prepared in light of the objectives and respondents were interviewed either at their home or work place. Ex-post facto research design was used. For measurement of variables included in study, different scales and scoring techniques were used. The result designated that amongst the fifteen selected variables of the of inland fish farmers in the study annual income, participation in training, exposure to agricultural mass media, risk orientation, achievement motivation, scientific orientation, innovation proneness and self confidence had establish positive and significant relationship with the knowledge regarding fish farming management practices of inland fish farmers, whereas education and

social participation had establish negative and significant relationship with the knowledge regarding fish farming management practices of inland fish farmers and age, caste, contact with extension agency, pond size and economic motivation failed to show any significant influence on the knowledge regarding fish farming management practices of inland fish farmers.

TOT 47

Relationship between profile of banana growers with their adoption of production technology

A. S. Patel[1], J. J. Mistry[2] and R. B. Rathod[3]

[1]Ph. D. Scholar, Department of Extension Education, CPCA, SDAU, Sardarkrushinagar

[2]Senior Scientist and Head, KVK, Khedbrahma

[3]Senior Research Fellow, Extension Education Institution, AAU, Anand

Email: archnapatel677@gmail.com

ABSTRACT

There is a constant shift in the area from field crops to horticultural crops over the period. This clearly indicates that the farmers are keen to take up profitable commercial horticultural crops than the traditional and less profitable field crops. Ex-post-facto research design was followed. Relationship was found that there was a positive and highly significant association between education, annual income, social participation, risk orientation, mass media participation and innovativeness. Age, type of family and land holding were found positive but non-significant relationship with level of adoption. While, extensions contact, economic motivation, scientific orientation, farming experiences and market orientation were found positive significant relationship with level of adoption.

TOT 48

Relationship between the profile and level of knowledge of dairy farmers about deworming and vaccination in buffalo

B. M. Rathavi[1], M. R. Patel[2] and M. Maheswaran[3]

[1]PG scholar, Dept. of Agril. Extension & Communication, AAU, Anand

[2]Assoc. Professor, Dept. of Agril. Extension & Communication, AAU, Anand

[3]Assistant Professor, Dept. of Agricultural Extension Education, KAU, Kerala

Email: newsmrp@gmail.com

ABSTRACT

India has the world's highest livestock population. Livestock rearing is an integral part of agriculture in India as well as many developing countries since centuries. The Indian dairy industry has made remarkable progress in the last three decades with unprecedented growth in milk production. Cattle and buffalo producing milk which is the largest agricultural commodity play a significant role in the Indian economy. A study between relationship between the profile and the level of knowledge of dairy farmers about deworming and vaccination in buffalo was carried out in district of Anand, Gujarat. Sample size of the present study was 100 dairy farmers doing deworming and vaccination in buffalo. Out of twelve independent variables, eight variables viz., education, experience, social participation, extension contact, agricultural mass media exposure, economic motivation, scientific orientation and attitude had positive and highly significant correlation with their knowledge regarding deworming and vaccination, whereas annual income had positive and significant correlation, remaining variables viz., age, land holding and herd size failed to show any correlation.

TOT 49

Development of scale of attitude of grape growers towards utilization pattern of pesticides

R. S. Karangami[1], S. B. Bhange[2], M. C. Ahire[3], A. M. Chavai[4] and G. B. Kabre[5]

[1]Assistant Professor, Department of Agricultural Extension, Amkheda

[2]Associate Professor, Department of Agril. Extension and Communication, Rahuri

[3]Professor, Department of Agril. Extension and Communication, Rahuri

[4]Assistant Professor, Department of Agril. Extension and Communication, Rahuri

[5]Associate Professor, Department of Agril. Entomology, College of Agriculture, Dhule

Email: ravindrakarangami14@gmail.com

ABSTRACT

In India, grape cultivation is one of the highly remunerative farming enterprises. Grape is India's most important commercial and high-quality fruit crop, accounting for the majority of the country's fresh fruit and vegetable exports to Europe and other areas of the world. The grape cultivation requires high investment right from the establishment of new vineyard. The present study was conducted in Nashik district of Maharashtra state. Two tahsils namely Niphad and Dindori selected purposively for this study on the basis of maximum area under cultivation of grape crop. From each selected tehsil, 12 villages were selected on the basis of higher production of grape crop. Total twenty two villages were selected randomly. From each selected village 12 grape growers were selected from each village making a total sample of 240 farmers. The data were collected through personal interview method. Pesticides are chemical compounds or mixtures of substances with adverse chemical nature and biological activity. The majority of the respondents had neutral level of attitude, while remaining respondents had 'highly favorable' and 'less favorable' level of attitude respectively.

TOT 50

Sensitivity of the farmers towards Anand Agricultural University

Ravikumar Chaudhari[1], J. B. Patel and Yogesh Rathwa[3]

[1]Research Associate, Extension Education Institute (EEI), AAU Campus, Anand

[2]Professor and Head, Dept. of Agril. Extension & Communication, BACA, AAU, Anand

[3]Senior Research Fellow, Extension Education Institute (EEI), AAU Campus, Anand

Email: ravichaudhari1627@gmail.com

ABSTRACT

Anand Agricultural University (AAU), established in 2004 under the Gujarat Agricultural Universities Act, plays a pivotal role in supporting the agricultural community through its tripartite mission of education, research and extension. This study focuses on understanding the level of sensitivity of the farmers within the jurisdiction of AAU, thereby evaluating its impact on rural development. A multistage proportionate random sampling method was employed to collect data from 240 farmers across 20 talukas spanning nine districts. Within each taluka, three villages were randomly selected, and four farmers were chosen at random from each village. This rigorous sampling approach yielded a diverse and representative sample of farmers for the study. The research design adopted for this study was ex-post facto. The findings indicate that a significant majority of the surveyed farmers exhibit a high level of sensitivity, ranging from good to excellent, towards Anand Agricultural University. The study's outcomes offer valuable insights into the impact and perception of AAU within its operational boundaries, shedding light on the institution's role in promoting sustainable agricultural practices and economic self-sufficiency among rural populations. This research contributes to the broader understanding of the pivotal role agricultural universities play in rural development.

TOT 51

Socio-economic profile of the GAB 6 growers

P. C. Patel, J. D. Desai and S. A. Sipai
Directorate of Extension Education, AAU, Anand

ABSTRACT

To study the profile of GAB 6 growers, a study with ex post facto research design was conducted after obtaining a list of beneficiaries from Main Vegetable Research Station, AAU, Anand and from that 78 beneficiaries were selected purposively, interview schedule was prepared and pre-tested to collect the data. The study revealed that more than two-fifths (44.87 %) of the beneficiaries were of the middle age group, followed by more than one-third (37.18 per cent) of the beneficiaries had a secondary level of education, nearly two-fifth (38.46 %) of the beneficiaries had a very high level of farming experience, more than half (55.13 %) of the beneficiaries had 1 year of experience in GAB 6 cultivation, a majority (75.64 %) of the beneficiaries had a marginal size of landholding, cent per cent of the beneficiaries had marginal land size, nearly half (47.44 %) of the beneficiaries had a low level of annual income, majority of the beneficiaries (70.51 %) had a membership in one organization and exactly one-third (33.33 %) of the beneficiaries had a very low level of mass media exposure, respectively.

TOT 52

Constraints perceived by tribal goat keepers of Banaskantha district

D. A. Sadrasaniay, S. H. Malve and V. K. Patel
Krushi Vigyan Kendra, S. D. Agricultural University, Deesa, Banaskantha
Email: drdevpatel86@gmail.com

ABSTRACT

An experiment was conducted in twelve villages of two tribal talukas namely Amirgadh and Danta of Banaskantha district to know the constraints perceived by the tribal goat keepers. For the study total 120 respondents were selected randomly. In socio-economic status, half of (51.67%) respondents were found in young age group, 73.33% illiterate, 57.50% land less, 40.86% having large flock size, 75.83% having medium annual income and more than fifty percent (51.67%) doing only goat rearing. For management of goat, 63.33% having open yard for keeping of goat only at night time, majority were not recorded individual animal's milk and followed knuckling method for milking. 73.33% followed vaccination, where as 61.67% followed regular deworming schedule. All the respondents thrown their dead animals outside the village, 71.67% not followed any methods for eradication of external parasite and 37.50% treating their animals by themselves, 69.17% respondents used their own buck for breeding of doe and 88.33% identified the heat of female goat by bleating method. The major indigenous technical knowledge used by goat keepers were mixture of onion and turmeric for primary treatment of kids, homemade mixture and leaves of mango for shedding of placenta and local plant (Trobet) for repair of facture in goat. The Major constrains faced by tribal goat farmers were less availability of nutritious feeds, high mortality rate in adult goat particularly in winter season due to viral diseases like FMD and CCPP and in kids due to diarrhoea, insufficient grazing land, poisoning occurs due to feeding of unwanted feeds during grazing and foot rot in rainy season. During period of scarcity farmers have to move other places, low price of milk in local market and disease incidence like mastitis and joint ill leads decrease in milk production.

TOT 53

Relationship between selected characteristics of banana growers and their knowledge of recommended production technology

A. S. Patel[1], J. J. Mistry[2] and R. B. Rathod[3]

[1]Ph. D. Scholar, Department of Extension Education, CPCA, SDAU, Sardarkrushinagar

[2]Senior Scientist and Head, KVK, Khedbrahma

[3]Senior Research Fellow, Extension Education Institution, AAU, Anand

Email: archnapatel677@gmail.com

ABSTRACT

The Indian economy is greatly dependent upon total agricultural produce in the country and more so horticultural produce also in the recent years. There is a constant shift in the area from field crops to horticultural crops over the period. Ex-post-facto research design was followed. A study was conducted in Navsari district of Gujarat state. Majority of the respondents (73.34 %) had medium knowledge level about improved banana practices. While, 15.83 per cent and 10.83 per cent of them were found to have high and low knowledge level about improved banana practices, respectively. Relationship was found that there was a positive and highly significant association between education, annual income, social participation, extension contact, scientific orientation and mass media participation. Age, type of family and land holding had positive and non-significants association with knowledge. While, economic motivation, risk orientation, innovativeness, farming experience, market orientation were found positive and significant relationship with level of knowledge.

TOT 54

Relationship between selected characteristics and attitude of agro-input dealers towards their occupation

Dhruv Patel[1], G. N. Thorat[2] and J. K. Patel[3]

[1]M.Sc. Scholar, Dept. of Agril. Extension and Communication, AAU, Anand

[2]Assistant professor, Institute of Distance Education Anand, AAU, Anand

[3]Director, Extension Education Institute, AAU, Anand

Email: dp.nnzz@gmail.com

ABSTRACT

In India, Agro-input dealers play a crucial indirect role in enhancing farm productivity and income. Due to their locational advantage and easy accessibility, they serve as important sources of agricultural information, offering guidance on technologies, recommendations, and input supply, contributing to farmers' decision-making processes. This study examines the relationship between specific characteristics and the attitudes of agro-input dealers towards their occupation. The study carried out in Anand district which is located in the middle Gujarat with the use of ex-post-facto research design. A questionnaire-based proportionate random sampling survey was conducted on 120 agro-input dealers in Anand district of Gujarat state. The statistical measures, such as SPSS and Microsoft excel were used and results shows out of fifteen independent variables, twelve variables *viz*., education, annual income, extension contacts, mass media exposure, economic motivation, market orientation, credit orientation, scientific orientation, management orientation, experience as input dealer, training received and social participation showed positive and significant relationship with their attitude towards occupation. Whereas, age, size of family and input supply ability failed to show any significant relationship with their attitude towards occupation. In step wise regression shows all the independent variables together had contributed 55.70 per cent variation and these independent variables viz; scientific orientation, market orientation and credit orientation accounted for 51.50 per cent variation in explaining attitude towards occupation. Also in path analysis direct and indirect

effects results shows market orientation was exerted highest direct as well as substantial indirect effect, where scientific orientation was exerted highest indirect effect on attitude of agro-input dealers towards their occupation. The study results can be taken into account to make necessary reforms by the policymakers.

TOT 55

Relationship of profile characteristics of groundnut cultivators with knowledge level on crop production technology

Swati N. Jalu[1], Minaxi K. Bariya[2] and Kiran Chandravadiya[3]

[1]P.G. Scholar, Department of Agricultural Extension, J.A.U., Junagadh

[2]Associate Professor, College of Agriculture, J.A.U., Mota Bhandariya

[3]Assistant Professor, College of Agricultural Information Technology, A.A.U, Anand

Email: minaxibariya@gmail.com

ABSTRACT

The present study was conducted Saurashtra region of Gujarat State using *ex-post facto* research design. In order to realize characteristics of groundnut growers, a sample of 160 groundnut growers, representing 16 villages of 12 talukas of Junagadh Jamnagar, Amreli, Bhavnagar, Gir-somnath and Rajkot of Saurashtra region of Gujarat state were drawn by multistage random and purposive sampling techniques. Total 80 demonstrator farmers were selected from NMOOP project of Krishi Vigyan Kendra of Saurashtra region of Gujarat and 80 non demonstrator farmers were selected from same villages for comparative purpose. The data was collected by personal interview through structured schedule. The results revealed that there was positive and significant association with the knowledge about recommended groundnut production technologies and size of land holding, annual income, mass media exposure, extension contact, innovativeness, risk orientation, economic motivation and yield index of demonstrator farmers, while in case of education, social participation, extension participation, scientific orientation there was positive and highly significant association with the knowledge about recommended groundnut production technologies.

TOT 56

Adoption of recommended groundnut production technology by the groundnut growers

Swati N. Jalu[1], Minaxi K. Bariya[2], Bindu Christian[3]

[1]P.G. Scholar, Department of Agricultural Extension, J.A.U., Junagadh

[2]Associate Professor, College of Agriculture, J.A.U., Mota Bhandariya

[3]Assistant Professor, College of Agriculture, AAU, Vaso

Email: swatijalu@gmail.com

ABSTRACT

The study was conducted in Saurashtra region of Gujarat State. A multistage, purposive and random sampling technique was used for the study. Out of eleven district of Saurashtra region, total five districts were selected purposively where cluster frontline demonstration on groundnut crop under National Mission on Oilseed and Oil palm (NMOOP) was conducted by KVKs during last two years. Five districts of Saurashtra region were selected for the study. Two talukas from each selected districts were selected purposively. Total 10 talukas were selected for the study. Villages from each taluka were selected purposively where maximum cluster frontline demonstrations are conducted by KVKs. Total 16 villages were selected purposively. The random sampling technique was used for the selection of the respondents. 80 demonstrator and 80 non demonstrator farmers were selected randomly from selected village for comparative study. Thus total 160 respondents were selected for this study. The analysis indicated that the independent sample 'Z' test showed

that there was significant difference in the mean values of demonstrator and non demonstrator groundnut growers in case of adoption of recommended groundnut production technology.

TOT 57

Association between profile of crop growers and the level of adoption of crisis management practices

Kumbhani S. R., Bhuva R. M. and K. L. Chaudhary
Assistant Professor
Department of Agricultural Extension and Communication, NMCA, NAU, Navsari, Gujarat.
Email: srkumbhani@nau.in

ABSTRACT

The present study was carried out in six districts of South Gujarat. Paddy, mung, tomato and banana crops were taken under the present study. Out of six districts, 360 crop growers and 48 researchers were selected. Thus, total sample size was 408 respondents for the present study. The study discloses that out of twenty independent variables; education, occupation, annual income, farming experience, source of information, economic motivation, scientific orientation, management orientation, innovativeness, overall modernity and cropping pattern were positively and highly significantly correlated, whereas age, land holding, social participation, risk orientation, market orientation and credit seeking behavior were positively and significantly correlated with the adoption of crisis management practices in crops by the farmers. Scientific orientations were positively and highly significantly correlated while, age, source of information, risk orientation, economic motivation, management orientation, material possession and market orientation were positively and significantly correlated with the adoption of crisis management practices in crops by the researchers.

TOT 58

Community based participatory approach for rural livelihood security of okra in Tapi district of South Gujarat

Gaurav Sharma and R. T. Khatri
Assistant Professor
Department of Agricultural Economics, NMCA, Navsari Agriculture University, Navsari
Email: gaurav30688@gmail.com

ABSTRACT

The commercialization of okra in agricultural landscape of Tapi is essentially an outcome of the participatory institutional interventions during the past four decades. These interventions have been found effective in transforming the regions agricultural sector from parochial paddy cultivation to commercial cultivation of okra. The major marketing-centric institutional interventions of the export promoting agencies have highlighted the relevance of institutional innovations in the promotion of okra in the region. A comparative gain of Rs. 37,475 per hectare has been reported for growers following export-oriented okra production. The study has shown the potential benefits of comprehensive institutional interventions persuaded by the export agencies in Tapi. A comparative analysis of marketing has revealed that marketing channel of okra via. exporting agency is the most efficient. The study has demonstrated the benefits of informal community participation with proper guidance and monitoring.

TOT 59

Economic analysis of backyard poultry interventions of ICAR Farmer *FIRST* programme on farmers

S. S. Sadaphal, P. B. Kharde and Baba Bhingarde
Department of Extension Education, MPKV, Rahuri
Email: sachinsadaphal@gmail.com

ABSTRACT

The ICAR Farmer FIRST programme is being implemented since 2016-17 in the two project villages Chinchvihire and Kangar in Rahuri tahsil of Ahmednagar district. The Farmer FIRST programme aims at enriching farmers-scientist interface for technology development and application. The backyard poultry farming is an age old practice in rural India. Most of the backyard poultry comprises rearing of indigenous birds with poor production performance. Potential of indigenous birds in terms of egg production is only 70 to 80 eggs/ birds / Year and also less meat production. However, backyard poultry production can be boosted up with improved breed of poultry bird. Backyard poultry component was successfully demonstrated through the ICAR Farmer FIRST programme in project villages. The present study was conducted mainly with the objective of to study the economic analysis of backyard poultry on the respondents. From these two villages 130 farmers were selected for study. It was observed that the majority of respondent had middle age, higher secondary education and medium experience in backyard poultry. The cost on feed accounted for 78.37 percent of the total cost of production in kaveri followed by poultry shed 11.15 percent, cost of day old chicks 6.70 percent and cost of vaccination is 1.00 percent. In case of income generation, it was found that maximum amount of income was contributed by sale of eggs 82.23 percent followed by sale of male birds 17.77 percent in kaveri breed. The benefit cost ratio in kaveri breed is recorded as 2.63 while in local breed it was 1.72.

TOT 60

Impact of front line demonstration on yield and economics of Wheat

Savaliya A. V., Baraiya K. P. and Baraiya A. K.
Krishi Vigyan Kendra, Junagadh Agricultural University, Jamnagar, Gujarat
Email: ankurv.savaliya@gmail.com

ABSTRACT

The present investigation was done by Krishi Vigyan Kendra, Jamnagar, Gujarat in its adopted villages to know the yield gap, economic return of *rabi* wheat between demonstrated field and farmers practices (FP) under irrigated condition. In this study, all those farmers on whose field FLD was conducted during the years 2019-20 to 2021-22 were selected as respondents. Before conducting FLD, the respondents were made abreast with the latest recommended package of practices of wheat. The demonstrated technologies under FLD resulted in an increase in yield by 11.8 percent over local check. It was also observed that there was technology gap (TG), extension gap (EG) and technology index (TI) of 2.7 q/ha, 5.6 q/ha and 4.8 percent, respectively. The average three years data observed that an average yield of demonstrated plot was obtained 53.1 q/ha. Over control (47.5 q/ha.) with an increase of 23.29 percent. The average cost benefit ratio was 3.3 and 2.4 in demonstrated field and farmer's practices was recorded during 2019-20to 2021-22 respectively. The gap between the two practices i.e., front line demonstration and farmer's practices may be due to the farmers has not followed the package of practices and latest technology from sowing to final harvest period of *Rabi* wheat.

TOT 61

Impact of Krushi Vigyan Kendra on knowledge level of potato growers about potato production technology

K. V. Chaudhry, S. P. Pandya and D. B. Patel
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University, Sardarkrushinagar
Email: kalachaudhary1811@gmail.com

ABSTRACT

Agriculture is the most pivotal sector of Indian economy in the current phase of development. There is need for transfer of improved agricultural technology from research station to the farmer's field. The ICAR mooted the idea of establishing KVK as innovative institutions for imparting vocational training to the farmers and field level extension functionaries. The present study was conceived with measuring the impact of Krushi Vigyan Kendra in terms of knowledge of farmers about potato production technology. The study was carried out in KVK, Deesa jurisdiction of Banaskantha district of Gujarat State. Out of seven talukas of KVK, Deesa jurisdiction, four taluka was selected and total twelve villages from the selected talukas were purposively selected on the basis of maximum numbers of activities carried out by KVK, Deesa. From each selected villages 10 beneficiary potato growers were selected randomly. Thus, 120 beneficiary potato growers were selected for the study. Ex-post facto research design was used for this study. Results of the investigation showed that nearly three-fifths (57.50%) of the beneficiary farmers had medium level of knowledge followed by 25.00 per cent with high and 17.50 per cent with low level of knowledge about potato production technology. Whereas, half (50.00%) of the non beneficiary farmers had medium level of knowledge, whereas remaining 31.67 per cent and 18.33 per cent of non beneficiary farmers had low and high level of knowledge about potato production technology, respectively.

TOT 62

Impediments faced by cumin farmers in management of cumin cultivation

P. S. Gorfad and H. R. Vadar
College of Agriculture, JAU, Khapat (Porbandar) – 360 579
Email: drpsgorfad@jau.in

ABSTRACT

Porbandar is primarily an agricultural district of Gujarat state. Groundnut and cotton are major crops of *kharif* season while the major crops cultivated in *rabi* season are wheat and cumin. The productivity of cumin crop is low as compared to potential yield. So, it is crucial to find out the impediments faced by cumin growers in adoption of cumin cultivation technology and obtained their suggestions to overcome these constraints. Therefore, the present study was undertaken in Porbandar district of Saurashtra region. The major impediments faced by cumin farmers in management of cumin cultivation were: Lack of knowledge about plant protection measures, Unavailability of disease resistant variety seeds at proper time, Irregular supply of electricity and Unaware about post-harvest technology. The important suggestion endorsed by farmers were: Government should provide technical know-how about plant protection measures by imparting training and organising demonstrations, Government should provide disease resistant variety seeds to farmers at reasonable rate, Sufficient electric power should be made available for long time and farmers should be trained about the importance of post-harvest technology.

TOT 63

Knowledge of rural women regarding fruit processing and preservation in Amreli district

Minaxi K. Bariya[1], V. S. Parmar[2] and J. V. Chovatia[3]
[1]College of Agriculture, JAU, Mota Bhandariya
[2]Krishi Vigyan Kendra, JAU, Amreli
[3]College of Agriculture, JAU, Junagadh
Email: minaxibariya@gmail.com

ABSTRACT

The state of Gujarat has a variety of soils, rainfall pattern, temperature regimes, and irrigation facilities. This diverse agro-climatic situation across the state holds potential for development of the horticulture sector in a big way. Focusing on the importance of fruits and vegetable processing and preservation, a study was conducted by the researcher to check the knowledge of rural women regarding fruit processing and preservation. *Ex-post facto* research design was applied for this study. Three hundred women selected from district with help of purposive random sampling. Study revealed that majority of the respondents (67.00 %) had medium level of knowledge about fruit processing and preservation, while 17.33 per cent of respondents had low and 15.67 per cent of respondents had high level of knowledge about fruit processing and preservation, respectively.

TOT 64

Profile and problems of agro-input dealers in Anand district of Gujarat

Dhruv Patel[1], G. N. Thorat[2] and J. K. Patel[3]
[1]M. Sc. Scholar, Dept. of Agril. Extension and Communication, AAU, Anand-388110
[2]Assistant Professor, Institute of Distance Education Anand, AAU, Anand-388110
[3]Director, Extension Education Institute, AAU, Anand-388110
Email: dp.nnzz@gmail.com

ABSTRACT

Agro-input dealers are pivotal intermediaries in the agricultural supply chain, facilitating the flow of essential resources from manufacturers to farmers. Operating primarily in rural and farming-centric locales, agro input dealers confront a myriad of challenges, including fluctuating input prices, regulatory hurdles, and fierce competition from larger agricultural supply chains. Nevertheless, they remain deeply engaged in their local farming communities, participating in training programs and agricultural events. This study was conducted to measure the selected characteristics of agro-input dealers towards their occupation also measure problems faced by them in running their business. The study carried out in Anand district which is located in the middle Gujarat with the use of Ex-post-facto research design. A questionnaire-based proportionate random sampling survey was conducted on 120 agro-input dealers in Anand district of Gujarat state. The statistical measures, such as SPSS and Microsoft excel were used and results shows Majority of the respondents belonged to middle age group having graduation and above to higher secondary level of education, belonged to medium size of family with medium to high annual income and having experience of 10.01 to 15 years and above as input dealer and they selling more than two types of inputs, had membership in one organization with medium to high level of extension contacts, and medium to high mass media exposure and they received more than one training. Further, high economic motivation, high market orientation, high credit orientation had higher management orientation and higher level of scientific orientation too. Major problems faced by them were debit behavior of farmers, insufficient subsidies for startup as input dealer, non-availability of quality seeds, short supply of inputs in critical time, high cost of inputs, Shortage of time to go for field visits on farmers' request. The study results can be taken into account to make necessary reforms by the policymakers.

TOT 65

Relationship between profile of potato growers and knowledge about potato production technology

K. V. Chaudhry, S. P. Pandya and K. N. Raval
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University, Sardarkrushinagar
Email: kalachaudhry1811@gmail.com

ABSTRACT

The present study was undertaken in KVK, Deesa of Banaskantha district. Out of 14 talukas of Banaskantha District seven talukas falls under the jurisdiction of KVK, Banaskantha-I (Deesa). Among the seven talukas four taluka were purposively selected on the basis of maximum numbers of activities carried out by KVK. From each selected talukas three villages were selected purposively on the basis of maximum numbers of beneficiary farmers. A comprehensive list of the beneficiary potato growers of each adopted village was obtained from KVK. From this list, ten beneficiary potato growers from each village were selected randomly for the study. Thus, 120 beneficiary potato growers were selected for the study. To know the impact of KVK, the same numbers of non beneficiary potato growers were selected randomly from same villages. Thus, altogether 120 beneficiary and 120 non beneficiary potato growers were selected for the study. Among the selected variables *viz.,* education, extension participation, source of information, scientific orientation, risk orientation, economic motivation and attitude had exerted positive and highly significant relationship while farming experience, size of land holding, occupation, yield and social participation had positive and significant relationship. Whereas, age exerted negative and non-significant relationship and annual income had positive and non-significant relationship with knowledge level about potato production technology.

TOT 66

Relationship between profile of women and their knowledge regarding fruit processing and preservation

V. S. Parmar[1], Minaxi K. Bariya[2] and J. V. Chovatia[3]
[1]Krishi Vigyan Kendra, JAU, Amreli
[2]College of Agriculture, JAU, Mota Bhandariya
[3]College of Agriculture, JAU, Junagadh
Email: vparmar801@gmail.com

ABSTRACT

The present study was carried out in the Amreli district of Gujarat state. Five talukas were selected purposively where horticultural crops are grown. From each taluka three villages were selected purposively where fruit crops are grown. From the each selected village, twenty rural women were selected randomly making a total sample of 300 rural women from ten villages. *Ex-post facto* research design was applied for this study. Study found that education, innovativeness and mass media exposure were positively and highly significantly correlated with knowledge regarding fruit processing and preservation. Whereas, only age of respondents were negatively and highly significantly correlated with the knowledge regarding fruit processing and preservation.

TOT 67

Relationship between profile of cumin growers and their knowledge about crisis management practices

K. N. Raval[1], J. K. Patel[2] and K. V. Chaudhary[3]

[1] and [3]Ph. D., Dept. of Agril. Extension and Communication, SDAU, Sardarkrushinagar

[2] Assistant Professor, College of Horticulture, SDAU, Jagudan

Email: kanvarishi@gmail.com

ABSTRACT

The crisis management in farming is activities or practices adopted by the farmers to stand against the crisis induced by the concentrated period of natural calamities, whether and other men created factors. The study was undertaken in Banaskantha, Patan and Kachchh districts which comes under North-West Agro-Climatic Zone as well as in jurisdiction of Sardarkrushinagar Dantiwada Agricultural University. From each selected district two talukas were selected. Hence, total six talukas were selected. From each selected taluka, five villages and from each village fifteen cumin growers were selected randomly. Thus, total 270 cumin growers were selected as sample size. Among the selected variables, education, extension participation, source of information, management orientation, risk orientation and innovativeness had exerted positive and highly significant relationship with knowledge of the cumin growers about crisis management practices, while cropping pattern and cropping intensity had positive and significant relationship. Whereas, age, farming experience, land holding, annual income and source of irrigation exerted non-significant relationship with knowledge of the cumin growers about crisis management practices.

TOT 68

Social effect of the COVID-19 pandemic on rural and urban community

Joshi Payal B. and Neeta Khandelwal

Dept. of Extension Education and Communication Management, ASPEE College of Nutrition and Community Science, S. D. Agricultural University

ABSTRACT

COVID-19 has enormously impacted the social life of the people. The study's objective was to investigate the effect of COVID-19 pandemic on social aspects of rural and urban community in Banaskantha district. The study sample consisted of 200 respondents randomly selected from ten rural and ten urban areas of Banaskantha district. An interview schedule was developed to collect primary data from respondents. The result showed that socially rural respondents were moderately affected during the lockdown but affected slightly in post-lockdown. In comparison, urban respondents' social and economic aspects were extremely affected during the lockdown and moderately affected post-lockdown. A significant difference between lockdown and post-lockdown for social and economic effects was found due to COVID-19 pandemic between rural and urban respondents. Overall, it can be concluded that COVID-19 adversely affected the social aspects of rural and urban communities during and post-lockdown. Thus, better management by the government against the COVID-19 pandemic is essential to mitigate the social crisis.

TOT 69

Socio-economic characteristics of demonstrator and non demonstrator groundnut growers in Saurashtra region of Gujarat

Swati N. Jalu[1], Minaxi K. Bariya[2] and Bindu Christian[3]

[1]P.G. Scholar, Department of Agricultural Extension, J.A.U., Junagadh

[2]Associate Professor, College of Agriculture, J.A.U., Mota Bhandariya

[3]Assistant Professor, College of Agriculture, AAU, Vaso

Email: minaxibariya@gmail.com

ABSTRACT

The present study was conducted Saurashtra region of Gujarat using ex-post facto research design. In

order to realize socio-economic characteristics of groundnut growers, a sample of 160 groundnut growers, representing 16 villages of 12 talukas of Junagadh, Jamnagar, Amreli, Bhavnagar, Gir-somnath and Rajkot of Saurashtra region of Gujarat state were drawn by multistage random sampling techniques. The beneficiaries of front line demonstration given by Krishi Vigyan Kendra under NMOOP project were selected for the study. The data were collected by personal interview through structured schedule. The results revealed that majority of the groundnut growers were in middle aged group, educated up to middle school, had medium social participation, medium size of land holding, annual income Rs. 1,00,001/- to Rs. 1,50,000/-, medium extension participation, mass media exposure and medium extension contact.

TOT 70

Suggestions from castor growers for maximum adoption of recommended castor production technology

K. V. Chaudhry[1], R. S. Prajapati[2] and R. J. Patel[3]

[1] and [3]Ph. D. Scholar, Dept. of Agril. Extension and Communication, SDAU, Gujarat

[2]Scientist (Extension Education), KVK, SDAU, Deesa, Gujarat

Email: kalachaudhry1811@gmail.com

ABSTRACT

India has exhibited a phenomenal growth in agricultural sector after independence. Production of a new technology is generally not the major problem now-a-day in our country. The agricultural scientists are capable of producing appropriate technology. The main problem as it exists today is that of diffusion and adoption of new farm technologies among the farmers. Several constraints influence the transfer of technology pertaining to seed production. The study examines suggestions explored by the castor growers to overcome from the constraints faced by them in adoption of castor production technology was conducted in Patan district of Gujarat state. Among the nine talukas of Patan district, Patan, Saraswati and Harij these three talukas were purposively selected because the area under castor cultivation is very high. Five villages from each selected talukas were selected randomly. Thus, total 150 farmers have been selected for the study and were interviewed with a structural pre-tested interview schedule. Ex-post facto research design was followed for carrying out the study. Major suggestions explored by the castor growers were; reasonable price should be given to agricultural produce (70.00%), certified seed should made locally (66.66%), price of agricultural inputs should be minimized (58.00%), timely technical guidance should be provided (53.33%) and crop loan should be provided to the farmers (33.33%).

TOT 71

Yield gap analysis of pigeon pea in Narmada district

V. K. Poshiya[1], M. V. Tiwari[2] and P. D. Verma[3]

[1]Asst. Prof. TWTC & I/c Senior Scientist and Head (Ext.Edu) Dediapada NAU, Narmada

[2]Scientist (H.Sc) KVK, NAU, Narmada

[3]Retd. Senior Scientist and Head (Ext.Edu), KVK NAU, Narmada

Email: vkposhiya @nau.in

ABSTRACT

There exists a large gap between technological development and its full application in the field of common farmers. The study on frontline demonstrations showed that there exists a huge untapped potential yield under real farming situations. The present study was conducted in Narmada district of Gujarat State as it is the jurisdiction of KVK, Dediapada. Out of five taluka of Narmada district, each taluka having highest area of pigeon pea were grow. 20 farmers from each village were purposively selected for study. Thus total 100 pigeon pea growers were selected for the study. Ex-post-facto research design was be used in proposed

investigation, an aim to analyze the socio-economic profile of 100 tribal farmers and measure of the extent of yield gap in pigeon pea farmers. Study found that very limit number of pigeon pea farmers (08.00 %) had no yield gap. Majority of the farmers (59.00%) had medium and (11.00%) large yield gaps. From the above data it could be interred that majority (92.00%) of respondents had yield gap ranging from (53.58 to 3.32 %) and no yield gap (08.00%) respondents was getting higher yield as compare to demonstration yield on farmer field, if the untapped potential farm yield could be fully exploited through the effective extension method. Therefore it could be concluded that yield gap between the potential yield and yield obtain in large yield gap respondents ranging (-04.70 to 53.58) could be bridge, respectively.

TOT 72

Adoption of Assam Agricultural University released rice varieties - A study in Udalguri district of Assam

Pallavi Deka[1], Debasish Borah[2] and Pallabi Das[3]

[1]SMS (Agril. Econ.), KVK, Udalguri, AAU, Assam

[2]Sr. Scientist & Head, KVK, Udalguri, AAU, Assam

[3]Assistant Professor, Dept. of Ext. Edu., Assam Agricultural University, Jorhat, Assam

Email: pallabi.das@aau.ac.in

ABSTRACT

In Assam, rice is the most significant and staple crop. It covers 2.54 million ha of the state's gross cropped area and accounts for 96% of the state's total food grain production. Being the major source of agricultural GDP, rice plays a significant role in state's economy. Many varieties were released by Assam Agricultural University, which are in accordance to the different land and agro climatic situation of the state. Therefore, in order to access the adoption of different AAU released rice varieties by the rice growers, a study was undertaken at Udalguri district of Assam. Forty numbers of rice growers were selected randomly from each five rice growing belts i.e Kacharital, Dewrigaon, Udalguri, Nalkhamara and Chandbari of the district which makes a total of two hundred numbers of respondents including marginal, small, medium and large farmers at the ratio of 1:2:3:4. Data were collected through PRA, group discussion and interview method with a structured schedule during the year 2022. Eight numbers of socio-economic parameters of respondents *i.e* age, education, income, land holding, land type, assess to extension services, market and input were taken as factors to quantify their effects on adoption of varieties. The results of the study revealed that among different AAU released rice varieties, *Ranjit* was adopted by 100.00 percent of growers followed by *Bahadur* (49.00 %), *Ranjit Sub-1* (27.50 %). The least adopted varieties were *Swarna Sub-1* (11.50 %) and *Dishang* (4.00 %). It was further revealed that age and land holding had a positive and significant effect whereas education and income had a negative and significant effect with adoption of AAU released rice varieties by growers of Assam.

TOT 73

Assessment of frontline demonstration on yield enhancement and economics of MDP technology in cotton in Surendranagar district

Bhoraniya M. F., Kalma R. P. and Patel D. A.

Krishi Vigyan Kendra, Junagadh Agricultural University, Surendranagar, Gujarat -363520

Email: mfbhoraniya@gmail.com

ABSTRACT

Frontline demonstrations on Bt. cotton with MDP technology for the control of pink boll worm (PBW) with recommended practices were conducted on 30 farmer's fields by Krishi Vigyan Kendra, JAU, Surendranagar, Gujarat on 12-hectare area in different villages of Surendranagar district during Kharif season

of 2019-20 to 2021-22. The results revealed that Bt. cotton variety with MDP technology recommended practices recorded significantly higher average seed cotton yield of 1878 kg ha-1, which was 17.58% higher than conventional variety with farmers' practice (1600 kg ha-1). The overall average extension gap of 278 kg ha-1 with technology gap (622 kg ha-1) and technology index (24.89) was recorded. The higher net return of Rs. 80485 ha-1 was obtained under the demonstration fields than farmers' practice (Rs. 64181 ha-1) with additional return of Rs. 16304 ha-1. Benefit cost ratio was also considerably higher in demonstration plot (3.15) than farmer's practice (2.81). So, MDP technology for the control of PBW in Bt. Cotton with recommended package of practices should be adopted in Saurashtra region of Gujarat for gaining higher yield and profit from cotton cultivation.

TOT 74

Assessment of frontline demonstration on yield enhancement and economics of sesame (GT-4) in Surendranagar district

Bhoraniya M. F., Kalma R. P. and Patel D. A.
Krishi Vigyan Kendra, Junagadh Agricultural University
Surendranagar, Gujarat -363520
Email: mfbhoraniya@gmail.com

ABSTRACT

Frontline demonstrations on improved variety of sesame GT-4 with recommended practices were conducted on 30 farmer's fields by Krishi Vigyan Kendra, JAU, Surendranagar, Gujarat on 12-hectare area in different villages of Surendranagar district during Rabi season of 2019-20 to 2021-22. The results revealed that improved variety of sesame GT-4 with recommended practices recorded significantly higher average grain yield of 494 kg ha-1, which was 14.06% higher than conventional variety with farmers' practice (432 kg ha-1). The overall average extension gap of 62.0 kg ha-1 with technology gap (1066 kg ha-1) and technology index (68.31) was recorded. The higher net return of Rs. 36243 ha-1 was obtained under the demonstration fields than farmers' practice (Rs. 29850 ha-1) with additional return of Rs. 6393 ha-1. Benefit cost ratio was also considerably higher in demonstration plot (3.44) than farmer's practice (3.03). So, improved variety of sesame GT-4 with recommended package of practices should be adopted in Saurashtra region of Gujarat for gaining higher yield and profit from wheat cultivation.

TOT 75

Association between characteristics of groundnut growers and their level of knowledge about plant protection measures

R. J. Patel[1], J. J. Mistry[2] and K. V. Chaudhary[3]
[1]and [3]Ph. D. Scholar, Dept. of Agricultural Extension and Communication, S. D. Agricultural University, Sardarkrushinagar, Gujarat
[2]Associate Professor, KVK, S. D. Agricultural University, Khedbrahma, Gujarat

ABSTRACT

Groundnut, 'the unpredictable legume' is also known as peanut, earthnut, monkey-nut and manilla-nut. It is the 6th most important oilseed crop and 13th most important food crop of the world. The present study was conducted in Banaskantha district. The district was selected purposively as the area of groundnut is increasing day by day. Three talukas *viz*., Deesa, Lakhani and Dantiwada having higher area under groundnut cultivation were selected purposively. Five villages were selected randomly from the list of groundnut growing villages of each taluka. Ten groundnut growers were selected, randomly from each selected villages. Thus, the final sample was 150 groundnut growers. Ex-post facto research design was used for the study. The data were collected by personal contact method with help of structured interview schedule and data were coded,

classified, tabulated and analyzed in the light of objectives. Ten independent and one dependent variables were selected for study. The independent variables viz., education, land holding, annual income, extension participation, source of information and scientific orientation were positively and highly significantly associated with knowledge about plant protection measures. Risk orientation had positive and significant association with knowledge about plant protection measures. The remaining variables namely age and family size had negative and non-significant association, while social participation had positive and non-significant association with knowledge about plant protection measures.

TOT 76

Constraints faced by cumin growers in adoption of crisis management practices

Raval K. N and J. K. Patel

[1]Ph. D. Scholar, Dept. of Agril. Extension and Communication, SDAU, Dantiwada

[2]Assistant Professor, College of Horticulture, S. D. Agricultural University, Jagudan

Email: pateljashvant080@gmail.com

ABSTRACT

Cumin is important cash crop, however, its production is most uncertain and fluctuates violently from year to year due to various crisis like the extreme variations in the climatic conditions, occurrence of number of disease mainly powdery mildew, blight and wilt as well as man-made factors. The present study was confined to *ex-post-facto* research design. The multistage sampling technique was used for selection of respondents. From each of three selected district *viz.;* Banaskantha, Patan and Kutch of North-West Agro-Climatic Zone two talukas having highest cumin area and production were selected. Three villages from each taluka and from each village, fifteen cumin growers were selected randomly. Thus, total 270 cumin growers were selected for the study. Major constraints faced by cumin growers in adoption of crisis management practices were; cumin blight cannot be controlled completely, price fluctuations, crop failure due to unfavorable weather conditions, unawareness about the recommendation dose of pesticides/fungicides and higher commission charges. Whereas, important suggestions given by cumin growers to overcome the constraints were; effective control measures should be developed for cumin blight, remunerative minimum support price should be fixed by government, provide insurance against crop failure, accurate weather information should be availed to farmers at right time, subsidy should be given on various inputs, training should be provided to cumin growers and good quality seed and chemical fertilizers should be available in sufficient quantity in time.

TOT 77

Constraints in adoption of recommended practices of goat farming in *ARYA* project

Sher Singh Bochalya, Kamlesh Choudhary and Shobhana Gupta

Department of Agricultural Extension and Communication, RVSKVV, Gwalior

Email: shersinghbochalya@gmail.com

ABSTRACT

Agriculture and related industries are the driving force behind our country's socioeconomic growth. What is particularly concerning in the current situation is that educated rural young, even agricultural graduates are not interested in pursuing a career in agriculture or its related sectors. Goat farming has a lot of potential and plays a big part in providing food and nutrition security in rural regions. After understanding the important role that young may play, the government has decided to launch a program to recruit and retain them in agriculture and related fields. The study was based on ex facto design and for the purpose 120 trained youth in goat farming were selected purposively who have obtained training on goat farming under ARYA project and 20 trainers were selected for suggestions for better run his program of the study area. Thus, a total

of 140 respondents were included in the study. It was concluded that most of the youth found lack of veterinary services (90.00 MPS), lack of knowledge about common diseases and their preventive measures (88.89 MPS) and lack of knowledge about the value of mineral mixture (85.56 MPS) as most perceived problems being faced in goat farming.

TOT 78

Crisis management practices adopted by cumin growers of North-West agro-climatic zone

Raval K. N and J. K. Patel

[1]Ph. D. Scholar, Dept. of Agril. Extension and Communication, SDAU, Dantiwada

[2]Assistant Professor, College of Horticulture, S. D. Agricultural University, Jagudan

Email: pateljashvant080@gmail.com

ABSTRACT

Cumin is important cash crop. However, its production is most uncertain and fluctuates violently from year to year due to various crisis like the extreme variations in the climatic conditions, occurrence of number of disease mainly powdery mildew, blight and wilt as well as man-made factors. The present study was confined to *ex-post-facto* research design. The multistage sampling technique was used for selection of respondents. From each of three selected district *viz.;* Banaskantha, Patan and Kutch of North-West Agro-Climatic Zone two talukas having highest cumin area and production were selected. Three villages from each taluka and from each village, fifteen cumin growers were selected randomly. Thus, total 270 cumin growers were selected for the study. The result of the study revealed that majority (83.33%) of the cumin growers had medium to low level of knowledge about crisis management practices, while great majority (87.04%) of cumin growers had medium to low level of adoption about crisis management practices. Majority of the cumin growers had knowledge as well as adoption of practices *viz.,* seed is safe from spuriousness and adulteration, deep ploughing before sowing, safe from soil erosion and postpone the irrigation during cloudy weather, unseasonal rainfall or when the sign of disease appear.

TOT 79

Knowledge and adoption level of farmers about improved cumin production technology

B. C. Bochalya, J. N. Vyas and Neha Tiwari

Krishi Vigyan Kendra

Junagadh Agricultural University, Surendranagar -363520

Email: bcb.kvk@gmail.com

ABSTRACT

Cumin is important spice crop; however, its production is most uncertain and fluctuates violently from year to year due to extreme variations in climatic conditions and occurrence of number of pest and fungal diseases namely powdery mildew, blight and wilt. The uncertainty in production of this crop causes wide variation in the income of the cumin growers. The average yield of the cumin found low in farmers field conditions as compare to its potential yield. This may be lack of knowledge and low adoption of recommended technologies among the farmers. Present study was carried out in Surendranagar district. 120 cumin growing farmers were selected for the study. An interview schedule was developed for measurement of knowledge and adoption level. Data were collected by personal interview method. The collected data were quantified, categorized and tabulated. Analysis was carried out by using frequencies and percentages. The result of the study revealed the cumin cultivation practices like tillage, Seed rate, irrigation management harvesting& storage and weeding were known to all most all cumin growers. The adoption study reveals that most of farmers were in medium level of adoption category.

TOT 80

Constraints faced by the respondents in adoption of improved cumin production

B. C. Bochalya, J. N. Vyas and M. K. Baraiya
KVK, JAU, Nana-Kandhasar, Surendranagar
Email: bcb.kvk@gmail.com

ABSTRACT

Cumin is important spice crop; however, its production is most uncertain and fluctuates violently from year to year due to extreme variations in climatic conditions and occurrence of number of pest and fungal diseases namely powdery mildew, blight and wilt. The average yield of the cumin found low in farmers field conditions as compare to its potential yield. This may be many hurdles faced by the farmers in cumin cultivation. Keeping the above facts in mind, the research study undertaken in Surendranagar district of Gujarat. 120 cumin growing farmers were selected for the study. An interview schedule was developed for measurement of constraints. Data were collected by personal interview method. The collected data were quantified, categorized and tabulated. Analysis was carried out by using frequencies and percentages. The study reveals under technical constraints were "Lack of soil testing facilities at nearby place" was felt by 87.50 per cent respondents, "Lack of know-how about seed treatment" was felt by 74.16 per cent respondents, however in economical constraints reveals that "High cost of labour", were felt by 90 per cent respondents which were ranked at 1st position, However, "High cost of pesticides" was felt by 79.16 per cent respondents, In marketing constraints it was depicted that "Lack of storage facilities", were felt by 54.16 per cent cumin growers which were ranked at 1st position, However, "Poor access to market informations" was felt by 46.66 per cent farmers. In miscellaneous constraints category reveals that "Adverse climatic conditions at crtical stages" was felt by 70.83 per cent respondents, "Poor water qualities" was felt by 64.16 per cent respondents.

TOT 81

Familiarity level of farmers about organic farming practices

B. C. Bochalya, J. N. Vyas and M. N. Patel
Krishi Vigyan Kendra, JAU,Nana-Kandhasar, Surendranagar
Email: bcb.kvk@gmail.com

ABSTRACT

Organic farming in India is being followed from ancient time. Organic agriculture in India has its roots in traditional agricultural practices that evolved in countless villages and farming communities over the millennium. Gujarat has remained a pioneer state in adopting organic farming. Adoption of organic agriculture necessarily involves a sequence of steps that need to be followed by the growers and verified by certification and inspection agencies. To find out the level of knowledge level of organic farming practices, respondents were selected from three talukas and 9 villages purposively. From each selected village, 10 farmers who were engaged in organic farming partially or fully were selected purposively. Thus, sample size consisted of 90 respondents from 9 village covered under study. Most of the respondents (98.89 %) had knowledge about mechanical cultivation practices, use of bio fertilizers in organic farming while 97.78 per cent respondents had knowledge about use of bio pesticide in organic farming and importance of crop rotation and use of oil cake for organic farming. 96.67 per cent respondents had knowledge about type of organic fertilizer may use for organic farming. 94. 44 per cent respondents were aware about land preparation methods. Least knowledge was about organic farming certification process. Only 6 per cent respondents had proper knowledge about organic certification process.

TOT 82

Knowledge of improved lemon production technology among the farmers

J. N. Vyas, M. N. Patel and A. K. Vala
Krishi Vigyan Kendra, Junagadh Agricultural University, Surendranagar -363520
Email: vyasjiju1807@gmail.com

ABSTRACT

India rank fifth among major lemon producing country in the world. Lemon (*Citrus limon*), is a member of family *Rutaceae* and grown in arid regions of India Specially Andhra-Pradesh and Gujarat. Lemon is an important fruit crop because of its large-scale use in export and processing purpose (Likewise make different products Juice, Pickles etc). The scientists have evolved modern improved lemon technologies but the farmers have not adopted these technologies due to one or more reasons resulting in low production of lemon. Present study was carried out in Surendranagar district. 60 lemon growing farmers were selected for the study purpose. For measurement of knowledge and adoption, an interview schedule was developed and data were collected by personal interview method. The collected data were quantified, categorized and tabulated. Based on knowledge scores farmers were classified into three categories *viz.*, Low, medium and high knowledge level. It is evident from study that majority of farmers (62 per cent) had medium knowledge level about recommended lemon production technology followed by high knowledge level (20 per cent). In order to assess the technological gap in the Lemon production technology, technological gap score of an individual farmer was measured. On the basis of technological gap score, mean and standard deviation were computed for classifying the respondents on the basis of extent of technological gap into three categories namely High, Medium and Low. The study reveals that 65 per cent respondents belong to medium level of technological gap followed by low technological gap (17 per cent). About one sixth (18 per cent) of the total sampled population adopted the recommended Lemon production technologies to little extent, which was considered as high level of technological gap.

TOT 83

Knowledge level of mung growers about post harvest technology of mung

D. B. Patel and Arnab Biswas
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University
Email: dbpatel821963@gmail.com

ABSTRACT

Mung forms an important part of Indian dietary habit. More than half of Indian population is vegetarian for whom mung is the major sources to fulfil their protein requirement. The post-harvest aspects in mung also hold significant consideration as the losses are higher during storage. So this study was conducted by using an *ex-post facto* research design with 120 respondents selected randomly from 3 talukas of Kachchh district. The result of the study indicated that nearly half of the mung growers (47.50%) were in the old age group and had higher secondary education, had more than 4.00 ha. of land holding, were using tube well as a source for irrigation, had membership in one organization, utilizing Agricultural scientist/KVK, Mobile/Internet, Television, Extension officer/ATMA and village level workers/ Extension officers their sources of information. Majority of the farmers possessed good knowledge about harvesting (99.17%), best time of harvesting (93.33%). Overall the respondents had medium to high level of knowledge (75.00%) about mung crop.

TOT 84

Level of participation in animal husbandry practices by the sons of dairy farmers

Nitin Patel, Krunal Gulkari and Hina Chawda
Krishi Vigyan Kendra, AAU, Arnej
Email: nitinpatel2712@aau.in

ABSTRACT

Animal Husbandry is one of the sources of income in rural livelihood. As per the 20th livestock census there is increase in cattle and buffalo population as well as the milk production in India was increased by 5 per cent to 221.06 million tonnes during the year 2021-22 in comparison to previous year, with that human population is also increased and reach to 1.3 billion, means there is increase in agricultural needs of humans but the trend showed that the youth is abandoning the agriculture which is need to worry about likewise there is need to check in animal husbandry. To know that this survey was carried out in which the level of participation of 220 sons of dairy farmers in different animal husbandry practices was asked and checked by personal contact in ten villages of Dholka and Dhandhuka taluka of Ahmedabad district. The data were classified, tabulated and analysed in order to make the findings meaningful. The descriptive statistics was calculated for the analysis and interpretation of the data. Animal husbandry practices carried out by sons of dairy farmers on a dairy farm were ranked from highest level of participation to least level of partition, in which it was found out that breeding related practices ranked first (100 %) and other managemental practices like dehorning and castration were performed by none. Most of the sons of dairy farmers engaged in breeding related practices (100%), buying-selling animal related things (76.45%) and replacing their animals (75.00%) whereas least level of participation seen in maintaining farm records (45.43%), value addition of milk and other animal related by-products (12.07%) and none of them performing dehorning and castration.

TOT 85

Identification of factors responsible for shifts in cropping pattern

V. B. Pardhi[1], S. S. Khandave[2] and B. T. Kolgane[3]
[1]M. Sc. Student in Agril. Extension, RCSM, College of Agriculture, Kolhapur
[2]Assosciate Professor, Agriculture Extension, College of Agriculture, Pune
[3]Assosciate Professor, Agriculture Extension, RCSM College of Agriculture, Kolhapur
Email: vidyapardhi1998@gmail.com

ABSTRACT

The present study identification of factors responsible for shifts in cropping pattern conducted in Pune district of Maharashtra state. For this study 10 farmers from each village selected comprise 15 villages as 150 respondents. The data analysed with help of statistical tools. It was observed from study that, physical, biological, resource related, economic factors had dominant role in change in cropping pattern. Among physical factors almost 92.67 per cent and of the respondents changed the crops quoting the reason as "variation in temperature and humidity" and "change in rainfall pattern". Majority of the respondents changed the crops due to resource related factors such as „more irrigation requirementfi (96.67 %). Among biological factors almost (88.67 %) of the respondents changed the crops because of "reduced yield due to pest and disease attack" followed by "more pest and disease incidence"(86.67). Among social factors majority of respondents price (90.00 %) changed crop due to market, More than seventy of farmers (71.33 %) influence to change cropping pattern due to legislative and administrative policies, followed by price maximization of MSP and FRP (52.00 %). Among the all factors under study biological factors (87.67 %) ranked first for shifts in cropping pattern, while physical factors (73.07 %) ranked second for shifts in cropping pattern.

TOT 86

A comparative study of performance of GJG - 22 and GG - 20 varieties of Groundnut

N. B. Jadav[1], S. J. Parmar[2] and J. V. Chovatia[3]

[1]Director of Extension Education, JAU, Junagadh

[2] and [3]Assistant Professor, Department of Agril. Extension, JAU, Junagadh

Email: dr_nbjadav@jau.in

ABSTRACT

The cornerstone of the Indian economy is agriculture. Since there are numerous ways to consume and use groundnut, it stands out among the oilseeds. Groundnuts are the edible seeds of a legume and they are high in protein, oil and fibre. Gujarat is the leading state in the production of the groundnut. Groundnut cultivation in Gujarat concentrated predominantly in Saurashtra region. Hence, the study was conducted purposively in Saurashtra region of 240 respondents with an objective to analyse the impact indicator under different combinations followed by groundnut growers. The study revealed that the majority of GJG-22 groundnut growers are in their middle age group, educated up to primary level education, own up to 2 ha of land, have a medium degree of farming experience, annual income, exposure to mass media, a medium yield index and are risk-averse. GJG-22 verity has a somewhat higher cultivation cost and net revenue than variety GG-20 based on impact indicator productivity. The effects of GJG-22 were found to have a highly significant association with education, annual income, and yield index. The effects of GJG-22 were positively and significantly correlated with land ownership and media exposure. It is suggested that there be sufficient seed availability at local level as the majority of farmers encountered a difficulty with the GJG-22 variety not being available locally.

TOT 87

Spread effect of non-lodging rice variety TPS 5

S. Nazreen Hassan, R. Latha, K. Kavitha, R. Selvarani and S. Suresh

Associate Professor (Agril. Extension), ICAR KVK, Kanyakumari, Tamil Nadu

Email: najuhassan@tnau.ac.in

ABSTRACT

India has been focusing on feeding the growing population. The pressure on land has prompted in opting for high yielding varieties to cope up with the growing needs. Kanyakumari being rice belt of the erstwhile Travancore State, it has certain indigenous varieties suitable for the high rainfall zone. The cultivation of indigenous Red rice varieties like samba was the priority of the district. These tall and lodging varieties with low yield and lesser response to the inputs, was slowly replaced with high yielding new varieties ASD 16, TPS3 and TPS 5. These white bold variety with good cooking quality and high yielding ability and has become the ruling variety replacing traditional samba in the district. A study on the spread effect of non lodging rice variety was taken up with specificity on finding the varietal acceptance by respondents and replacement pattern observed since the release of a new variety. The study focuses on TPS 5 with respect to varietal acceptance and area expansion. This variety has replaced 69.55% of the total area cultivated. The major factor behind the sudden expansion of area was due to its non logding character during flood that occurred during 2021 and due to its performance in SRI method which yielded on and average of 6 T/ ha and 5.4 tonnes in natural farming situations in the district. The crop survived the submerged condition with lesser damages in yield.

TOT 88

Knowledge of white grub management technologies by groundnut growers of North Gujarat

R. R. Prajapati, R. N. Patel and S. M. Patel
Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar
Email: rakeshext.edu@gmail.com

ABSTRACT

The study was conducted in groundnut growing districts of North Gujarat *viz*., Banaskantha, Sabarkantha and Aravalli. Multistage random sampling technique was used to select sample of 360 respondents. The knowledge test was developed to measure the knowledge level of the groundnut growers regarding white grub management technology. With regards to knowledge of the groundnut growers about white grub, nearly one-third (34.16%) of the groundnut growers had adequate knowledge about life cycle of white grub, all the respondents had knowledge for identification of white grub's larva. While, 60.55 percent of the groundnut growers had knowledge for identification of white grub's adult and overwhelming majority (89.44%) of the groundnut growers possessed knowledge about nature of damage and time of infestation and habitation of white grub. In case of cultural practices for white grub management, almost all the groundnut growers had adequate knowledge. With regards to mechanical practices, majority of the respondents had knowledge about shaking host trees to dislodge and destroy beetles and use of light trap during the onset of monsoon while, negligible number of the groundnut growers had knowledge about use of pheromone trap. In case of bio-control measures, nearly one-third of the groundnut growers possessed knowledge about fungus *metarhizium* while, knowledge about bacteria bacillus papillae and nematodes for biological management of white grub was lacking among groundnut growers. With regards to chemical control, majority of the groundnut growers were aware about seed treatment, drenching of insecticides to infected plants and application of insecticide with irrigation except spraying insecticides on the boundary trees to destroy habitation of white grub.

TOT 89

Adoption of white grub management technologies by groundnut growers of North Gujarat

R. N. Patel, R. R. Prajapati and Sunil G. Joshi
Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar
Email: rakeshext.edu@gmail.com

ABSTRACT

The study was conducted in groundnut growing districts of North Gujarat *viz*., Banaskantha, Sabarkantha and Aravalli. Multistage random sampling technique was used for the study. Four talukas from each selected district, two villages from each selected taluka and 15groundnut growers from each selected village were randomly selected to constitute a random sample of 360 respondents. The extent of adoption of white grub management technology by the groundnut growers was measured by developing an adoption index. Adoption of white grub management practices was standardized against in five categories *viz.* Cultural practices, Mechanical practices, Biological practices, Chemical practices and Community approach. In case of adoption of cultural practices for white grub management, all the respondents adopted two-time primary tillage, deep summer ploughing was adopted by only one-fourth (25.55%) of the respondents. While, very few groundnut growers adopted heavy flood irrigation (12.77%) and well decomposed FYM (13.33%) to manage white grub. Data regarding adoption of mechanical and biological control practices were discouraging. Adoption of mechanical and biological control measures was almost absent in the study area. For biological control, fungus *metarhizium* was adopted by only 10.27 per cent of the groundnut growers. In case of chemical control practices, groundnut growers were vigorously using seed treatment and drenching of

insecticides to infected plants. Drenching of insecticides to infected plants was adopted by more than three-fifths (63.61%) of the groundnut growers, while nearly two-fifths (38.33%) of the groundnut growers adopted seed treatment. Mass campaigning *i.e.,* community action to eradicate white grub from the village/area was not organized at all in the study area.

TOT 90

Impact of cluster front line demonstrations on productivity and profitability of groundnut under NMOOP in Amreli district

N. M. Kachhadiya,V. S. Parmar and P. J. Prajapati
Krishi Vigyan Kendra, JAU, Amreli
Email: nileshmk.aau@gmail.com

ABSTRACT

NMOOP was launched in 2014 to increase the production of oilseeds and oil palm in India. Schemes include cluster demonstrations on improved package of practices and seed distribution of hybrid and HYVs. Cluster-based demonstrations for groundnut cultivation involve the establishment of demonstration plots in specific clusters or regions, where farmers are introduced to improved cultivation techniques, varieties, and management practices. These demonstrations aim to showcase best practices, provide training, and encourage adoption of improved groundnut cultivation methods. An impact assessment of CFLDs conducted by KVK, Amreli was assessed. The results were compared between CFLD plots and control plots (Farmer Practice). The CFLD on groundnut registered 12.46 percent higher yield over farmer's practice on an average in year 2020-21. Average extension gap was recorded 2.74q ha^{-1} (2019-20) and average technology gap was recorded 4.29 q ha^{-1} (2019-20). The technology index ranged from 3.59 per cent to 14.30 per cent. The results indicated that the cluster frontline demonstration made a good impact on the farming community of Amreli district as they were motivated by the new agricultural technologies applied in the CFLD of Groundnut.

TOT 91

Dairy animal feeding management practices in Aravalli district of North Gujarat

H. D. Chauhan, P. D. Patel, K. J. Ankuya, A. K. Srivastava and Falguni Parmar
Chimanbhai Patel College of Agriculure, SDAU, Sardarkrushinagar, Gujarat

ABSTRACT

A survey based study was conducted to know animal management practices adopted by dairy farmers in Aravalli district. Total 150 farmers were randomly selected. Majority (90.66 %) respondents were from SEBC category of middle (54.60) age. Mixed herd (52%) of crossbred cows and buffaloes were maintained. 82 % farmers adopted intensive system of rearing with individual feeding. More than two-third farmers utilized community water source and adopted automatic water trough in animal shed. Majority (88.66 %) farmers fed weeds to their animals. About 91.3 % farmers fed both leguminous and non-leguminous fodders and majority farmers (90.66 %) fed concentrate feed purchased from villages co-operative society.

TOT 92

Association between technological gap and selected characteristics of summer groundnut growers

S. M. Hirapara, D. B. Patel, Arnab Biswas and Aniket Deshpande
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University
Email: dbpatel821963@gmail.com

ABSTRACT

Summer groundnut (*Arachis hypogea L.*) is the most popular oilseed crop grown in tropical and subtropical region of the world. It is also known as the “poor man's almond”. This study was designed as Ex-

post Facto research and a multistage random sampling method was adopted to select the sample. Total 180 summer groundnut growers were randomly selected from twenty villages belongs to Deesa, Dantiwada, Palanpur and Vadgam talukas of Banaskantha district of Gujarat state. The data were collected by personal contact method with help of structured interview schedule. Thirteen independent variables were selected for study. These are the individual characteristics of the groundnut growers. The independent variables *viz.*, education, annual income, irrigation method, sources of information, extension participation and economic motivation had negative and significant correlation with technological gap, whereas age and farming experience of the summer groundnut growers had positive and significant correlation with technological gap. On the other hand social participation, mass media exposure, risk orientation and knowledge had negative and highly significant correlation with gap.

TOT 93

Technological gap in recommended summer groundnut production technology

S. M. Hirapara, D. B. Patel and Arnab Biswas
Department of Agricultural Extension and Communication
C P College of Agriculture, S D Agricultural University
Email: dbpatel821963@gmail.com

ABSTRACT

Summer groundnut is the most popular oilseed crop grown in tropical and subtropical region of the world. The present study was conducted to know the technological gap of summer groundnut growers of Banaskantha district by using ex-post facto research design and multistage random sampling method. Total 180 summer groundnut growers were selected from twenty villages of Deesa, Dantiwada, Palanpur and Vadgam talukas of Banaskantha district of Gujarat. The study revealed that the high technological gap was present in 76.67 per cent in plant protection followed by weed control 75.00 per cent, seed treatment (68.33 per cent), chemical fertilizer (65.00%), spacing (62.78%), FYM (57.22%), sowing time (54.44%), irrigation (46.67%), interculturing (39.44%), crop rotation (32.78%), variety (31.67%), seed rate (29.44%) and harvesting (25.56%), which were ranked as first to thirteen, respectively.

TOT 94

Knowledge of dairy farmers about periparturient diseases in bovine in Anand district

Shreeja Swami[1], U. M. Patel[2] and R. U. Chaudhari[3]
[1]PG Scholar, College of Veterinary Science and Animal Husbandry, KU, Anand – 388 001
[2]Associate Professor & Head, College of Veterinary Science and Animal Husbandry, KU, Anand.
[3]Ph.D. Scholar, C. P. College of Agriculture, SDAU, S. K. Nagar - 385 506
Email: umpatel9@gmail.com

ABSTRACT

The periparturient diseases of the dairy cow are a manifestation of the cow's inability to cope with the metabolic demands of high production and they continue to be a cause of economic loss to the dairy industry and an animal welfare concern. The present study was conducted in 4 talukas of Anand district of Gujarat. Total 20 villages were selected from each taluka and 10 dairy farmers were selected randomly from each village for the study. Data were collected through pre-structured interview schedule. The overall knowledge of dairy farmers about periparturient diseases was found 72.91 per cent. Chronologically, knowledge of individual periparturient diseases was the observed highest in Prolapsed (90.66%) followed by Downer's cow syndrome (90.37%). Nearly two-third (66.00%) of the dairy farmers had high level of knowledge about periparturient diseases. All twelve independent variables showed a positive and highly significant relationship with the dairy farmers' knowledge concerning periparturient diseases.

TOT 95

Impact of frontline demonstration on the yield and economics of brinjal in Rajkot

A. R. Parmar, N. B. Jadav and A. J. Bhatt

Krishi Vigyan Kendra, Junagadh Agricultural University, Pipalia (Dhoraji), Rajkot-II.

Email: kvkpipalia@jau.in

ABSTRACT

The Study was carried out in a Farmer's field at Different Blocks of Rajkot District, Gujarat. Frontline Demonstrations were conducted on brinjal with the active participation of the farmers on the objective of improved technologies of brinjal production potential. The improved technologies consist new released variety (GRB-5), balanced fertilizers (soil test based) application, integrated pest and disease management, etc. In India brinjal is the most common, popular and principal vegetable crops grown throughout the country . The development of the agriculture is primarily depends on the application of the scientific technologies by making the best use of available resources. One of the major constraints of traditional brinjal farming is low productivity because of non-adoption of advanced technologies like improved varieties. To increase the production, productivity and quality of agricultural produce, front line demonstrations are being conducted at various farmer's field. The data related to the cost of cultivation, production, productivity, gross return and net return were collected as per schedule and analyzed. Result of the present study revealed that higher yield in the demonstration was recorded (393.8 q/ha) as compared to farmers practice (331.3 q/ha) traditionally adopted by the farmers. The percentage increase in the yield over farmer's practice 18.84 was recorded. The extension gap, technology gap and technology index were computed 62.5 q/ha, 78.13 q/ha and 16.55 % respectively. The demonstrated field gave higher net return Rs.139775 and B:C ratio 1:3.78. The result of the study indicated the gap between potential and demonstration yield is due to weather conditions and soil fertility. Here results shows clearly that the yield and economics of brinjal can be boost up by adopting recommended technologies.

Human Resource and Entrepreneurship Development (HRD)

HRD 1

Relationship between selected characteristics of the cotton seed producer farmers and their management efficiency

K. V. Mashaliya[1], R. R. Prajapati[2] and P. H. Patel[3]

[1]Ph. D. Scholar, Dept. of Agricultural Extension & Communication, CPCA, SDAU

[2]Associate Professor, College of Agriculture, SDAU, Tharad

[3]Ph. D. Scholar, Dept. of Agricultural Extension & Communication, BACA, AAU, Anand

Email: kishanmashaliya01@gmail.com

ABSTRACT

The study was carried out in Sabarkantha district of Gujarat state. Ex-post facto research design and multiple random sampling techniques were followed for selection of the cotton seed producer farmers. Thus, total 240 cotton seed producer farmers were selected as sample size. The data were collected through personal interview and then after it is compiled, tabulated and analyzed to get proper answer with the help of various appropriate statistical tools. For measurement of variables included in study, different scales and scoring techniques were used. The result designated that amongst the fourteen selected variables of the of cotton seed producer farmers in the study education, experience, land holding, annual income, social participation, participation in training programme, extension contacts, mass media exposure, economic motivation, risk orientation, scientific orientation and self confidence had positive and significant relationship with management efficiency of the cotton seed producer farmers, whereas age and market orientation failed to show any noteworthy influence on management efficiency of the cotton seed producer farmers.

HRD 2

Training need assessment of agri-input dealers in Assam

Pallavi Saikia[1], Pallabi Das[2] and Pallabi Deka[3]

[1]SMS (Agril. Extn.), KVK, Golaghat, Assam

[2]Assistant Professor, Dept. of Ext. Edu., Assam Agricultural University, Jorhat, Assam

[3]SMS (Agril. Econ.), KVK, Udalguri, Assam

Email**:** pallabi.das@aau.ac.in

ABSTRACT

In India, research and extension are two crucial components of agricultural growth. To achieve continuous expansion in agriculture, an effective extension system can quickly disseminate farm technology throughout farming communities. Agricultural input dealers play a significant role in the production and sale of agricultural products in addition to the extension services provided to farmers by the state Department of Agriculture and other organizations. Due to their easy accessibility in rural regions, they build a solid connection and help to enhance the agricultural extension system by offering the farming community useful services in a way that disseminates technology. Therefore, it is crucial that they take refresher training courses to provide themselves with the most recent agricultural expertise and information. Hence keeping this in mind, the present investigation was conducted in Jorhat, Golaghat, Morigaon and Udalguri districts of Assam during 2021-22 to ascertain training needs of agro-input dealers. A total 120 numbers of Agri-input dealers were selected as respondents by proportionate allocation method from each of the four districts. Data were collected by using pretested structured interview schedule. The needs assessment were done in the training areas *viz*., manures and fertilizers , pesticides, seeds, farm machineries, computer application and record keeping with three point continuum of 'much needed', 'needed' and 'not needed' having the value of 3,2 and 1 respectively. The data were analyzed with the help of proper statistical techniques and it was revealed that 96.66 percent of the respondents require training on integrated nutrient management practices, 70 percent have much need for pest protection of stored seeds, training on certification techniques of seeds (76.66 %),

latest farm implements and machinery (78.06 %) and 75.97 have much need for training on record keeping software.

HRD 3

Knowledge of agro input dealers about certificate course on pesticide management

N. M. Pithiya[1], H. C. Chhodavadia[2] and N. B. Jadav[3]

[1]Agriculture Officer, Department of Agronomy, CoA, JAU, Junagadh-362 001

[2]Associate Director of Extension Education, Office of DEE, JAU, Junagadh-362 001

[3]Director of Extension Education, Office of DEE, JAU, Junagadh-362 001

Email: nimishpithiya@jau.in

ABSTRACT

Agro input dealers serves as an important link between the manufactures and the farmers and he has the responsibility to disseminate latest farm technology up to the field level. So, knowledge about pesticides is crucial for the agro input dealers. The farmers have more trust on the agro input dealers as they are more localize. There is a high need that proper recommendations should be communicated for sustainable usage of inputs and for proper understanding by the farmers about the product and process. The agro input dealers give information about new varieties, proper fertilizers and pesticides use to the farmers. If the agro input dealers have proper knowledge about pesticides, they can transfer that to the farmers for improving farming by boost up production which ultimately resulting in increasing living standard of farmers. The present study was conducted in Junagadh, Rajkot, Porbandar and Amreli district of Gujarat state by collecting data from 160 agro input dealers who had completed certificate course on pesticide management using purposive and random sampling technique. The study revealed that knowledge level of agro input dealers about certificate course on pesticide management, slightly less than three-fifth (58.13 %) of the input dealers had medium level, followed by 18.11 per cent, 11.87 per cent, 11.11 per cent and 1.87 per cent of the input dealers had high, very high, low and very low level of knowledge.

HRD 4

Profile of agro input dealers in relation to certificate course on pesticide management

H. C. Chhodavadia[1], N. M. Pithiya[2] and D. A. Padaliya[3]

[1]Associate Director of Extension Education, Office of DEE, JAU, Junagadh-362 001

[2]Agriculture Officer, Department of Agronomy, CoA, JAU, Junagadh-362 001

[3]Ph. D. Scholar, Dept. of Agril. Extension Education, CoA, JAU, Junagadh-362001

Email: harshad@jau.in

ABSTRACT

Agro input dealers are business persons with or without a technically qualification and a service provider. However, majority of the pesticides dealers do not have formal education in agriculture. It is essential therefore to impart technical knowledge on pesticides, pest management and advisory based on scientific recommendations. To recognizing this strong farmer-input dealer network and to address this issue the government of India has structured a certificate course on pesticide management with the help of NIPHM to bring a paradigm shift into Indian agricultural extension system. The present study was conducted in Junagadh, Rajkot, Porbandar and Amreli district of Gujarat state by collecting data from 160 agro input dealers who had completed certificate course on pesticide management using purposive random sampling technique. The study revealed that 50.00 per cent of the respondent belong to middle age group, 55.00 per cent had education up to middle school (9^{th} to 10^{th} standard), 48.75 per cent belonged to very high annual income, 51.25 per cent had medium social participation, 51.87 per cent had medium experience as a dealer, 54.37 per cent had medium utilization of source of information, 53.13 per cent had medium level of mass media

exposure, 51.25 per cent had no training received, 61.87 per cent had medium extension contact, 51.25 per cent had medium level of economic motivation, 55.62 per cent had medium level of management orientation, 55.62 per cent had medium level of innovativeness, 67.50 per cent had medium level of risk orientation, 35.00 per cent had high level of achievement motivation and 29.37 per cent of the input dealers had a high level of scientific orientation.

HRD 5

Development and standardization of a scale to measure self-confidence of rural youth about orchard farming

Patel, M. R., Vinaya Kumar, H. M. and N. B. Chauhan
Dept. of Agril. Extension & Communication, BACA, AAU, Anand, Gujarat
Email - newsmrp@gmail.com

ABSTRACT

Orchard farming is the fastest growing sector in India and contributes immensely to poverty eradication and nutritional security. This sector has immense scope in India to increase the income and employment for the population and helps in sustaining a large number of industries. Orchard crops play a unique role in the Indian economy by improving the income of the farmers. For understanding the orchard farming adopting self-confidence of rural youth, the scale to measure the orchard farming adopting self-confidence of rural youth was developed. In initial stage, 36 statements reflecting self-confidence of rural youth about orchard farming were collected from relevant literature and discussion with experts of extension and horticulture disciplines. The collected statements were edited according to the criteria laid down by Edward (1957) and then 27 statements reflecting self-confidence of rural youth about orchard farming were selected as they were found to be unambiguous.Based on the median and Q values, 12 statements reflecting self-confidence of rural youth about orchard farming were finally selected to constitute self-confidence scale. The test was found to be reliable (0.81) and valid.

HRD 6

Development of the test to measure knowledge of dairy farmers regarding deworming and vaccination in buffalo

Rathavi Bhavesh M[1]., Mahesh R. Patel[2] and Meenu Maheswaran[3]
[1]PG scholar, Dept. of Agril. Extension & Communication, BACA, AAU, Anand, Gujarat
[2]Assoc.Professor, Dept. of Agril. Extension & Communication, BACA, AAU, Anand, Gujarat
[3]Ph. D. scholar, Dept. of Extension Education, NAU, Navsari
Email : meenumaheswaran62@gmail.com

ABSTRACT

India has the world's highest livestock population Livestock rearing is an integral part of agriculture in India as well as many developing countries since centuries. The Indian dairy industry has made remarkable progress in the last three decades with unprecedented growth in milk production. Cattle and buffalo producing milk which is the largest agricultural commodity play a significant role in the Indian economy. For understanding the knowledge of dairy farmers regarding deworming and vaccination in buffalo, knowledge test was developed. There were total 40 items in final knowledge test to measure the level of knowledge of dairy farmers regarding deworming and vaccination in buffalo after working out 'Index of item difficulty', 'Index of item discrimination' and 'Index of item validity. The test was found to be reliable (0.88) and valid.

HRD 7

Development and standardization of a scale to measure attitude of youth towards agri startup programs

Patel, M. R., Vinaya Kumar, H. M. and J. B. Patel
Dept. of Agril. Extension & Communication, BACA, AAU, Anand, Gujarat
Email: newsmrp@gmail.com

ABSTRACT

The Indian startup ecosystem has evolved dynamically over the last two decades. Some startups were founded in the 2000s, but the ecosystem was still immature as only a few investors were active, and the number of support organisations such as incubators and accelerators was limited. Hence, the study aims to develop and standardize a scale to measure the youth attitude towards startup programms. For understanding the attitude of youth towards Agristart up programs, the scale to measure the attitude of youth towards Agristart up programs was developed. In initial stage, 27 statements reflecting attitude of youth towards Agristart up programs were collected from relevant literature and discussion with experts of agriculture and allied sectors. The collected statements were edited according to the criteria laid down by Edward (1957) and then 19 statements reflecting attitude of youth towards Agri startup programs were selected as they were found to be unambiguous. Based on the median and Q values, 08 statements reflecting attitude of youth towards Agri startup programs were finally selected to constitute attitude scale. The test was found to be reliable (0.81) and valid.

HRD 8

Development and standardization of a scale to measure self-confidence of rural youth about floriculture farming

Patel, M. R., Vinaya Kumar, H. M. and N. B. Chauhan
Dept. of Agril. Extension & Communication, BACA, AAU, Anand, Gujarat
Email : newsmrp@gmail.com

ABSTRACT

Floriculture farming is the fastest growing sector in India and contributes immensely to poverty eradication and nutritional security. Floriculture crops play a unique role in the Indian economy by improving the income of the farmers. For understanding the floriculture farming adopting self-confidence of rural youth, the scale to measure the floriculture farming adopting self-confidence of rural youth was developed. In initial stage, 34 statements reflecting self-confidence of rural youth about floriculture farming were collected from relevant literature and discussion with experts of extension and horticulture disciplines. The collected statements were edited according to the criteria laid down by Edward (1957) and then 22 statements reflecting self-confidence of rural youth about floriculture farming were selected as they were found to be unambiguous. Based on the median and Q values, 12 statements reflecting self-confidence of rural youth about floriculture farming were finally selected to constitute self-confidence scale. The test was found to be reliable (0.79) and valid.

HRD 9

Development and standardization of a scale to measure self-confidence of rural youth about vegetables farming

Patel, M. R., Vinaya Kumar, H. M. and N. B. Chauhan
Dept. of Agril. Extension & Communication, BACA, AAU, Anand, Gujarat
Email - newsmrp@gmail.com

ABSTRACT

Vegetable farming has immense scope in India to increase the income and employment for the population and helps in sustaining a large number of industries. Vegetables crops play a unique role in the

Indian economy by improving the income of the farmers. For understanding the vegetables farming adopting self-confidence of rural youth, the scale to measure the vegetables farming adopting self-confidence of rural youth was developed. In initial stage, 35 statements reflecting self-confidence of rural youth about vegetables farming were collected from relevant literature and discussion with experts of extension and horticulture disciplines. The collected statements were edited according to the criteria laid down by Edward (1957) and then 24 statements reflecting self-confidence of rural youth about vegetables farming were selected as they were found to be unambiguous. Based on the median and Q values, 10 statements reflecting self-confidence of rural youth about vegetables farming were finally selected to constitute self-confidence scale. The test was found to be reliable (0.77) and valid.

HRD 10

Agripreneurs and social media

Serene Shekhar and Sarita Sanwal
Sardarkrushinagar Dantiwada Agricultural University, S K Nagar, Gujarat
Email: shekhar.sdau@sdau.edu.in

ABSTRACT

Indian economy is agrarian economy and social media have gained an important share in the agricultural sector because of their utility. On an average, Indians spent about 19.8 hours every month on WhatsApp a slight dip of 1.5% from 2020, however, it suggests 3.1% overall growth since 2018.Nationally, merely there are seven states: Gujarat (96%), Himachal Pradesh (95%), Manipur (91.9%), Kerala (97.6%), Mizoram (94.9%), Punjab (91.2%) and Sikkim (93.7%) where more than 90 % of rural dwellers have smartphones. The adoption of social technology by smallholder farmers has been surprising, as WhatsApp and Facebook are widely used among them. This has led to an increase of 67.6% in smartphone use in rural markets (Khan, 2022). Farmers who use mobile phones are more alert to agricultural management than those who do not use mobile phones. It is clear from this study that most farmers use cell phones to collect and exchange agricultural information. Thus, by building a presence on various social media sites, agripreneurs can expand their pool of leads far beyond their local borders. They can also create and share original content designed to establish their brand identity, build brand authority, and establish themselves as a notable player in their industry.

HRD 11

Antecedent of KVK scientists about their attitude towards organizational design

Yaksh Patel[1], J. K. Patel[2] and Neeta Kalasariya[3]
[1] and [3]PG Student, Dept. of Ext. Education and Communication, BACA, AAU, Anand
[2]Director, Extension Education Institute, AAU, Anand – 388 110
E-mail:- yakshpatel97@gmail.com

ABSTRACT

This present study entitled "Antecedent of KVK scientists about their attitude towards organizational design" was conducted in 2022 in four states of India viz., Gujarat, Maharashtra, Rajasthan and Goa with a sample size of 240 KVK scientists. The ex-post facto research design was used for the research study. Krishi Vigyan Kendra is an institutional project of ICAR for testing, training and transfer of agricultural technologies for the benefit of farmers, farm women and youths. Organizational design is the term frequently employed to describe the psychological structure of organization and their sub units. Good organizational design helps improve communication, increase productivity, and inspire innovation. Owing to the importance of organizational design in KVKs for effective communication and innovation. It was, therefore felt necessary to analyze the KVK scientists' attitude towards organizational design. The action of individual KVK scientist is governed by personal, economic, social, communicational and psychological factors

involved in situation. KVK scientists' shows different level of attitude towards organizational design. Thus, it may be stated that the attitude towards organizational design differs with such characteristics. Hence, considering the importance of these characteristics and review of past research studies, an attempt has been made in this investigation to ascertain the relationship if any, between profile of KVK scientists and their attitude towards organizational design. The result concluded that majority of KVKs scientists had perceived organizational design of KVK as most favorable. The result also revealed that out of eighteen independent variables nine variables viz. knowledge about ICT, achievement motivation, attitude towards extension work, professionalism, job satisfaction, job involvement, level of exposure to new farming idea, empathy and planning orientation were found to be positive and highly significantly correlated while education had negative and highly significant correlation with attitude towards organizational design. While professionally training received had negative and significant correlation with attitude towards organizational design. Regression coefficient indicated that one-unit change in job satisfaction and job involvement would affect 0.323 units and 0.167 units change in attitude towards organizational design, respectively.

HRD 12

Attitude of agri students towards agri entrepreneurship

Meghana Bantupalli
M.Sc. (Agricultural Extension & Communication) B. A. College of Agriculture, AAU, Anand
Email : meghanabantupalli23@gmail.com

ABSTRACT

The attitude of students towards agricultural entrepreneurship plays a pivotal role in shaping the future of the agricultural industry. After completing degree in agriculture, students have diverse career paths available to them. Despite exposure to Entrepreneurship Learning Programs (ELP) and awareness of its benefits, many students don't pursue entrepreneurship. As more people pursue higher education, many university graduates face job difficulties. This emphasizes the need to inspire students to view entrepreneurship positively, as it can enable them to make jobs instead of just searching for them. This paper aims to explore the entrepreneurial mindset of B.Sc. students, their attitude, including factors that encourage or discourage them from choosing entrepreneurship as their future path. This study was conducted in Anand agricultural university among 60 students who are studying in 3rd and 4th year of their agricultural degree in Anand. The data was collected through Google form using pre tested questionnaires and research design used was ex post-facto research design and factors effecting the attitude of students are discussed: among all the independent factors (age, education, academic achievement, risk orientation, motivation, annual income) motivation and risk orientation has the Significant relationship with the attitude and it was concluded that students have moderate attitude, Outcomes of the study are universities should provide more training or workshops giving chance to explore and be confident about their choice and government should create policies which provide financial aids to the new entrepreneurs for encouraging them.

Keywords: Agriculture, Attitude, Agri-entrepreneurship, student

HRD 13

Attitude of the students towards agrotourism in Navsari

Jayasudha J., R. M. Naik, P. N. Patel and K. L. Chaudhary
Agricultural Extension & Communication, N. M. College of Agriculture, NAU, Navsari

ABSTRACT

Agrotourism is any agriculturally based operation or activity that brings visitors to a farm or ranch and it has different definitions in different parts of the world, and sometimes refers specifically to farm stays. It is said that agrotourism is a better way to know about the traditional agricultural farming activities which brings

us very close to mother-nature and it is also very essential thing for a sustainable living on this planet. The main objective of the study is to analyse the attitude of students towards agrotourism. The study has been conducted among the post graduate students studying in Navsari Agricultural University. *Ex post facto* research design was used for the study and the total sample size was 104. The results found that majority (53.85%) of the students had favourable attitude towards agrotourism. The variables such as self confidence was positively associated with the attitude of the students at 1 per cent level, followed by annual family income, father occupation and area of residence had positively associated with attitude of the students at 5 per cent level of significance. The idea of agrotourism can give agriculture a fresh look where local resources are used to increase the profitability of agricultural land.

HRD 14

Constraints faced and suggestions given by Panchayat Raj leaders in implementation of agricultural development programmes

Patil, S. S.[1], Kanani P. R.[2] and Jadav N. B.[3]

[1]Senior Research Assistant, RCSM, College of Agriculture, Kolhapur, Maharashtra

[2]Former Head of the Department, Department of Extension Education, JAU, Junagadh

[3]Head of the Department, Department of Extension Education, JAU, Junagadh

Email: hiradeep183@rediffmail.com

ABSTRACT

The study was conducted in elected representatives from two districts Junagadh and Amreli of Gujarat state to ascertain constraints faced and suggestions given by them in delivering the responsibilities towards agriculture development. Garett's ranking technique was used to rank constraints. Majority of the leaders of PRI's consider 'inadequacy of devolution of power' (73.25, 'insufficient funds for development work' (68.02) which was ranked I & II. 'Delayed approval of resolutions' and 'Undermining of implementation of agricultural development schemes through panchayat raj' were the next important constraints given by the respondents. Lack of proper infrastructure at Panchayat office and 'lack of proper staff strength' was found to be valuable constraints and Lack of regular training to elected reprentatives' and 'Lack of information technology (IT) knowledge' ranked VII and IX. With suggestions given by respondents majority (68.02 per cent) suggested to increase staff with panchayat, followed by avoiding unnecessary delay in sanctions (66.86 per cent) and provision of sufficient development grants (63.95 per cent) ranked third. Providing of proper training to elected members and office bearers regarding functioning of panchayat as well as information technology was suggested by 61.04 per cent respondent.

HRD 15

Correlation between the profile of awarded farmers and their entrepreneurial makeup

S. A. Sipai, P. C. Patel and K. G. Khadayata

Directorate of Extension Education, AAU, Anand

Email: khanese@aau.in

ABSTRACT

The study was conducted in all the nine districts of middle Gujarat, with 228 awarded farmers selected through proportionate random sampling method. The data were gathered through personal interviews and then assembled, tabulated, and analysed to obtain adequate answers for the specific objectives of the study using various appropriate statistical tools. The study reveals that amongst the sixteen independent variables, eight variables viz., education, social participation, market facility, farm media exposure, training received, extension participation, attitude and information seeking behaviour had positive and significant, while rest

eight variables had non-significant relationship with entrepreneurial makeup of awarded farmers of middle Gujarat.

HRD 16

Demographic profile of awarded farmers of middle Gujarat

S. A. Sipai, J. D. Desai, Pinakin C. Patel
Directorate of Extension Education, AAU, Anand
Email: khanese@aau.in

ABSTRACT

The study was conducted in all the nine districts of middle Gujarat, with 228 awarded farmers selected through proportionate random sampling method. Majority of the awarded farmers of middle Gujarat were from middle to old age group, educated up to secondary, higher secondary or graduate/post-graduate level, engaged in agriculture and animal husbandry as their main occupation, married and had high to medium level of farming experience. Majority of the awarded farmers had very high to high level of family support, had 5 to 8 members in family, small to medium size of land holdings., annual income up to Rs. 5,00,000 and majority of them had membership in at least one or more than one organization. Majority of the awarded farmers had medium to very high exposure to the different farm media, high to very high level of extension participation, more access to training, favourable to strongly favourable attitude towards agricultural technologies developed by SAUs and had high to very high level of information seeking behaviour.

HRD 17

Determinants of KVK scientists about ability to organize training programme

Yaksh Patel[1], J. K. Patel[2] and Nikita Thakor[3]
[1]PG Student, BACA, AAU, Anand
[2]Director, [3]Research Associate, Extension Education Institute, Anand
E-mail:-yakshpatel97@gmail.com

ABSTRACT

This present study entitled “Determinants of KVK scientists about ability to organize training programme” was conducted in 2022 in four states of India viz., Gujarat, Maharashtra, Rajasthan and Goa with a sample size of 240 KVK scientists. The ex-post facto research design was used for the research study. Krishi Vigyan Kendra is an institutional project of Indian Council of Agricultural Research (ICAR) for testing, training and transfer of agricultural technologies for the benefit of farmers, farm women and rural youths. The scientist working in KVKs performs two main functions namely research and extension activities. Organize training to update the extension personnel and vocational training is the main mandates of KVK. Owing to the importance of training programs in KVKs for the agriculture development of districts. It was, therefore felt necessary to analyze the KVK scientists' ability to organize training programme. The action of individual KVK scientist is governed by personal, economic, social, communicational and psychological factors involved in situation. KVK scientists' shows different level of ability to organize training programmes. Thus, it may be stated that the ability to organize training programmes differs with such characteristics. Hence, considering the importance of these characteristics and review of past research studies, an attempt has been made in this investigation to ascertain the relationship if any, between profile of KVK scientists and their ability to organize training programme. The result concluded that vast majority of scientists had very high to high level of ability to organize training programme. The result also revealed that out of eighteen independent variables nine variables viz. knowledge about ICT, achievement motivation, attitude towards extension work, professionalism ,job satisfaction, job involvement, level of exposure to new farming idea, empathy and planning orientation were found to be positive and highly significantly correlated while native place had positive and significant and education had negative and significant correlation with ability to organize

training programmes. Influence of different indicators was not alike in determination of ability to organize training programmes.

HRD 18

Difficulties experienced by the awarded farmers in the journey of becoming a successful farmer

S. A. Sipai[1], J. D. Desai[2] and M. T. Khorajiya[3]

[1]and [2]Assistant Extension Educationist, DoEE, AAU, Anand

[3]Research Associate, CoA, AAU, Jabugam

Email: khanese@aau.in

ABSTRACT

The study was conducted in all the nine districts of middle Gujarat, with 228 awarded farmers selected through proportionate random sampling method. The data were gathered through personal interviews and then assembled, tabulated and analysed to obtain adequate answers for the specific objectives of the study using various appropriate statistical tools. Major important difficulties experienced by the awarded farmers in the journey of becoming a successful farmerwere: poor availability of labours round the year, high input cost, high market price fluctuations, lack of skill with family labour and issues of blue bulls, pigs & monkeys.

HRD 19

Direct, total indirect and substantial indirect effects of independent variables on entrepreneurial makeup of awarded farmers

S. A. Sipai[1], S. R. Patel[2] and P.C. Patel[3]

[1]and [3]Assistant Extension Educationist, DoEE, AAU, Anand

[2]Principal, CoA, AAU, Jabugam

Email: khanese@aau.in

ABSTRACT

The study was conducted in all the nine districts of middle Gujarat, with 228 awarded farmers selected through proportionate random sampling method. The data were gathered through personal interviews and then assembled, tabulated and analysed to obtain adequate answers for the specific objectives of the study using various appropriate statistical tools. The path analysis of entrepreneurial make up showed that attitude, extension participation and market facility were the key variables in exerting considerable direct, indirect and substantial effect on the entrepreneurial makeup of awarded farmers.

HRD 20

Entrepreneurial attitude of under graduate agriculture students

Rathod, L. S[1], V. M. Patel[2] and J. K. Patel[3]

[1]M.Sc (Agril.), CPCA, SDAU, Sardarkrushinagar

[2]Assistant Professor, Wheat Research Station, SDAU, Vijapur

[3]Assistant Professor, College of Horticulture, SDAU, Jagudan

ABSTRACT

Indian agriculture is known for multi-functionaries of providing employment, livelihood and ecological securities. Unemployment rising particularly among educated people is alarming for the governments. Total 160 third and final year students of B.Sc. (Horns) Agriculture were selected in academic year 2021-22 by proportionate stratified random sampling from two Colleges *viz.* C.P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University and College of Agriculture, Tharad. It was observed from the study that majority of the under graduate students had favourable entrepreneurial attitude. Out of ten

independent variables, three variables *viz.,* family landholding, participation in extra-curricular activities and source of information were positively and significantly correlated with entrepreneurial attitude of under graduate students further, family income and achievement motivation had positive and highly significant relation with attitude while, rest five had failed to establish significant relationship with entrepreneurial attitude of under graduate students.

HRD 21

Entrepreneurial behaviour and motivational sources for entrepreneurial behaviour of ornamental nursery owners

P. N. Patel[1], R. M. Naik[2] and Jayasudha J.[3]

[1]M.Sc. and [3]Ph.D., Dept. of Agril. Ext. & Comm., NMCA, NAU, Navsari, Gujarat

[2]Principal and Dean, N. M. College Agriculture, NAU, Navsari, Gujarat

Email: pratik04082@gmail.com

ABSTRACT

The present study was conducted in four *talukas* of the Navsari district of South Gujarat namely Khergam, Chikhli, Gandevi and Vansda during the year 2022-23. For the present study an *ex-post facto* research design was used. From each selected *talukas* 25 respondents were randomly selected, thus for present study total 100 sample size was obtained. The study was conducted to find out the entrepreneurial behaviour and motivational sources for the entrepreneurial behaviour of ornamental nursery owners of the study area. The entrepreneurial behaviour of ornamental nursery owners was assessed from risk orientation, achievement motivation, scientific orientation, management orientation, innovativeness and decision-making ability. The study revealed that the majority of ornamental nursery had a medium level of entrepreneurial behaviour. The study also revealed that the majority of ornamental nursery owners had a medium level of risk orientation, achievement motivation, scientific orientation, management orientation, innovativeness and decision-making ability. Additionally, study revealed that among the six components of entrepreneurial behaviour management orientation contributed highest in calculating entrepreneurial behaviour, followed by scientific orientation, risk orientation, achievement motivation, decision-making ability and innovativeness based on their mean percentage ranking. The study further revealed that less than half of the ornamental nursery owners had progressive nursery owners, followed by self and neighbours/friends/relatives as their motivational sources for entrepreneurial behavior.

HRD 22

Factors affecting information seeking behavior of trained input dealers

N. U. Kalasariya, J. K. Patel and R. B. Rathod

Extension Education Institution, AAU, Anand– 388110

E-mail:-kalsariyaneeta9@gmail.com

ABSTRACT

This present study entitled "Factor Affecting Information Seeking behaviour of Trained Input Dealers" was conducted in the year 2022 in Gujarat state of India. A sample of 230 trained input dealers was selected from these states. The ex-post facto research design was used for the research study. The private sector plays a major role in the seeking of information about new technologies and new recommendations. The trained input dealers are one of them. Information needs may be realized from the trained input dealers or from the data expert on behalf of this information seeker. Thus, it may be stated that the information seeking behaviour differs with such characteristics. Hence, considering the importance of these characteristics and review of past research studies, an attempt has been made in this investigation to ascertain the relationship if any, between profile of trained input dealers and their information seeking behaviour. The result found that vast

majority of the trained input dealers had very high information seeking behaviour and out of twenty independent variables thirteen variables viz. education, social participation, extension contact, cosmopolitenes, mass media exposure, input supply ability, innovativeness, economic motivation, scientific orientation, risk orientation, achievement motivation, planning orientation and market orientation were found to be positive and highly significantly correlated with information seeking behaviour.

HRD 23

Factors attributed to the success of awarded farmers of middle Gujarat

S. A. Sipai[1], S. R. Patel[2] and Hiren K. Patel[3]

[1]Assistant Extension Educationist, DoEE, AAU, Anand

[2]Principal and Unit Head, CoA, AAU, Jabugam

[3]Assistant Research Scientist, MFRS, AAU, Anand

Email: khanese@aau.in

ABSTRACT

The study carried out in the nine districts of middle Gujarat to find out the factors attributed to the success of awarded farmers. The study reveals the most important factor as accorded by the farmers was strong desire to innovate in agriculture/agri. allied fields which ranked first (2.070 Mean Score) followed by vast experience in agriculture/agri. allied fields (2.013 Mean Score), ability to maintain interpersonal relationships relevant to work (1.991 Mean Score), timely availability of useful information (1.992 Mean Score) and support of all concerned (1.987 Mean Score) which ranked second, third, fourth and fifth, respectively. The other important factors in descending order were enough knowledge of agricultural subject(1.982 Mean Score), management skill (1.961 Mean Score), constant guidance of agricultural scientists/extension workers (1.952 Mean Score), support from the family members (1.947 Mean Score), training undertaken on the subject (1.943 Mean Score), strong affinity for agriculture/agri-allied fields (1.934 Mean Score), sharing of information with other progressive farmers/people (1.930 Mean Score), participation in agricultural exhibition/*Krishi Mahotsav*/field day (1.908 Mean Score) and adequate knowledge about the market(1.882 Mean Score).

HRD 24

Factors influencing the career choices of students in agriculture

Kalariya Bhautik S.[1] and Hemlata Saini[2]

[1]P.G. Student, AAU, Anand

[2]Assistant Professor, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

Email: bhautikkalariya.118@gmail.com

ABSTRACT

This research investigates the factors influencing career choices among university students, particularly in agricultural education. Conducted at Anand Agricultural University in Gujarat, India, the study explores variables such as gender, Grade Point Average, parental and peer pressure, students' interests, family land holdings, social responsibilities, parental qualifications, and annual income on career decisions. The study reveals a positive perception of agriculture as a lucrative and promising career path among students. Surprisingly, parental and peer pressure have limited influence on career choices, and gender does not significantly affect the decisions. However, family income, students' interests, family land holdings, social responsibilities, parental qualifications, and annual income play a substantial role in career selection. The research emphasizes the importance of career guidance and counseling in helping students make informed decisions. The study recommends government support, including grants for agricultural graduates, and highlights the need for ongoing career exploration and skills development. These findings have implications

for policymakers, educators, and career counselors, providing insights to enhance support for students in career decision-making.

HRD 25

Knowledge level of trained input dealers about the different modules of training

N. U. Kalasariya[1], J. K. Patel[2] and Y. M. Patel[3]

[1]Senior Research Fellow, Extension Education Institution, AAU,Anand– 388110

[2]Director, Extension Education Institute, AAU, Anand –388 110

[3]Ph. D. Scholar, Dept. of Agril. Extension & Communication, BACA, AAU, Ananad - 388110

E-mail:- kalsariyaneeta9@gmail.com

ABSTRACT

This present study entitled "Knowledge level of trained input dealers about the different modules of training" was conducted in the year 2022 in Gujarat state of India. A sample of 230 trained input dealers was selected from these states. The ex-post facto research design was used for the research study. The result indicated that majority of trained input dealers had very high-level of agro ecological situation, soil health management, Crop Production Technology, Pest, Disease and Weed control in Agriculture, Farm Implements and Machinery, Irrigation Techniques and their management, Seed & Seed Production, Extension Management and Personal Development and overall knowledge and out of twenty independent variables ten variables viz. social participation, extension contact, cosmopolitenes, input supply ability, economic motivation, achievement motivation, planning orientation and market orientation were found to be positive and highly significantly and scientific orientation and risk orientation had positive and significant correlated with overall knowledge level of the different modules of training.

HRD 26

Relationship between profile of the inland fish farmers and their ability in coordinating activities

P. H. Patel[1], J. K. Patel[2] and S. G. Rathava[3]

[1]Ph. D. scholar, Dept. of Agricultural Extension & Communication, BACA, AAU, Anand

[2]Director, Extension Education Institute, Anand

[3]Ph. D. scholar, Dept. of Agricultural Extension & Communication, CPCA, SDAU

Email: patelpratik8396@gmail.com

ABSTRACT

The study was carried out in Anand district of Gujarat state with 150 randomly selected inland fish farmers. A pre-tested interview schedule was prepared in light of the objectives and respondents were interviewed either at their home or work place. Ex-post facto research design was used. For measurement of variables included in study, different scales and scoring techniques were used. The result designated that amongst the fifteen selected variables of the of inland fish farmers in the study annual income, participation in training, exposure to agricultural mass media, risk orientation, achievement motivation, scientific orientation, innovation proneness and self confidence had establish positive and significant relationship with the ability in coordinating activities of inland fish farmers, whereas education and social participation had establish negative and significant relationship with the ability in coordinating activities of inland fish farmers and age, caste, contact with extension agency, pond size and economic motivation failed to show any significant influence on the ability in coordinating activities of inland fish farmers.

HRD 27

Relative importance of independent variables in explaining entrepreneurial makeup

S. A. Sipai[1], S. R. Patel[2] and J. D. Desai[3]

[1] and [3]Assistant Extension Educationist, DoEE, AAU, Anand

[2]Principal, CoA, AAU, Jabugam

Email: khanese@aau.in

ABSTRACT

The study was conducted in all the nine districts of middle Gujarat, with 228 awarded farmers selected through proportionate random sampling method. The data were gathered through personal interviews and then assembled, tabulated and analysed to obtain adequate answers for the specific objectives of the study using various appropriate statistical tools. The findings reveals that attitude accounted for 30.00 per cent variation, while attitude along with market facility accounted for 36.40 per cent variation. Further, attitude, market facility and education explained 39.10 per cent variation, whereas attitude, market facility, education and information seeking behaviour accounted for 40.90 per cent variation in entrepreneurial makeup. The R^2 values at each stage of step wise regression were found to be significant.

HRD 28

Suggestions from awarded farmers for the farming community to improve the farming

S. A. Sipai[1], P. C. Patel [2] and M. T. Khorajiya[3]

[1]and [2]Assistant Extension Educationist, DoEE, AAU, Anand

[3]Research Associate, CoA, AAU, Jabugam

Email: khanese@aau.in

ABSTRACT

The study was conducted in all the nine districts of middle Gujarat, with 228 awarded farmers selected through proportionate random sampling method. The data were gathered through personal interviews and then assembled, tabulated and analysed to obtain adequate answers for the specific objectives of the study using various appropriate statistical tools. Major important suggestions endorsed by the awarded farmers for the farming community to improve the farming were: input cost should be reduced, integrated farming system should be adopted, scientific approach in farming must be made, improved seeds must be used and marginal and small farmers should be given priority in various farm promotional schemes.

HRD 29

Training need of farmers regarding rainwater harvesting and groundwater recharge

P. S. Jayswal[1], N. Tiwari[2], N. S. Joshi[3], V. S. Parmar[4] and K. N. Sondarva[5]

[1,2,3,4] Krishi Vigyan Kendra, JAU, Amreli

[5]College of Agril. Engg. and Tech., NAU, Dediapada

Email: priti.jayswal@jau.in

ABSTRACT

Rain is the main source of input water in agriculture, along with that it also required to recharge groundwater resources, which harvested during monsoon period of the year. Keeping the importance in mind one survey project was done for farmers of Amreli district of Gujarat state to find the training needs of farmers regarding rainwater harvesting and groundwater recharge. For scheduled interview filling, 300 farmers were randomly selected from 5 villages of three taluka of the Amreli district facing water scarcity problem. *Ex-post-facto* research design was used in the present investigation. Outcome of the survey was that if any field

extension workers of want to provide training to the farmers of Amreli district on rainwater harvesting and groundwater recharge methods must be as per the need of the area. The training venues can be selected at their village, Krishi Vigyan Kendra or Farmers' training centre. It will be more suitable for the farmers and farm women if the timing of training is arranged through field visits, demonstrations and lectures before the onset of cropping season and one to two days training with a gap of not more than 6 months.

HRD 30

Difference among the different indicators of entrepreneurial competence

P. C. Patel[1], J. K. Patel[2] and S. A. Sipai[3]

[1]and [3]Assistant Extension Educationist, DoEE, AAU, Anand

[2]Director, EEI, AAU, Anand

ABSTRACT

The study was conducted in the Anand districts of middle Gujarat, with 150 randomly selected inland fish farmers as respondents. In light of the objectives, the interview schedule was prepared and respondents were interviewed either at their homes or office. The study reveals that the difference among the different indicators which determine entrepreneurial competence was found significant which implies that the performance of different indicators varies from one to another and the mean per cent score of competency in the evaluation of the situation was highest followed by self-confidence, ability to co-ordinate activities, persistence, ability to mobilize resources efficiently, competition orientation, information-seeking behaviour, professional zeal, risk orientation, decision making ability, imitativeness, planning orientation and market orientation.

HRD 31

Direct effect, substantial effect and total indirect effect on the entrepreneurial competence of inland fish farmers

P. C. Patel[1], J. K. Patel[2] and S. A. Sipai[3]

[1]and [3]Assistant Extension Educationist, DoEE, AAU, Anand

[2]Director, EEI, AAU, Anand

ABSTRACT

The study was conducted in the Anand districts of middle Gujarat State, with 150 randomly selected inland fish farmers as respondents. In light of the objectives, the interview schedule was prepared and respondents were interviewed either at their homes or office. The study reveals that annual income exerted the highest direct effect and substantial effect and economic motivation exerted the maximum total indirect effect on the entrepreneurial competence of inland fish farmers.

HRD 32

Entrepreneurial competence of inland fish farmers

P. C. Patel[1], S. A. Sipai[2] and Jignesh Macwan[3]

[1]and [2]Assistant Extension Educationist, DoEE, AAU, Anand

[3]Research Associate, IABMI, AAU, Anand

ABSTRACT

The study was conducted in the Anand districts of middle Gujarat State, with 150 randomly selected inland fish farmers as respondents. In light of the objectives, the interview schedule was prepared and respondents were interviewed either at their homes or office. The study reveals that the majority of the inland fish farmers had a very high level of competence in the evaluation of the situation and had a high level of self-

confidence, decision making ability, coordinating ability, ability to mobilize resources, professional zeal, competition orientation, persistence and information-seeking behaviour with a medium level of risk orientation, innovativeness, planning orientation and market orientation. The majority of the inland fish farmers had a high level of overall entrepreneurial competence with an overall mean entrepreneurial competence index of 69.

HRD 33

Perception of agriculture students towards the Rural Agricultural Work Experience programme

Patel Rutvi M.[1] and Hemlata Saini[2]

[1]P.G. Student, AAU, Anand

[2]Assistant Professor, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

Email: rutvipatel117@gmail.com

ABSTRACT

The Rural Agricultural Work Experience Programme (RAWE) is a pivotal component of agricultural education, offering students practical exposure to rural farming practices. This research paper delves into the perceptions of agriculture students regarding the RAWE program, aiming to uncover their experiences and the impact of this immersive learning opportunity. The present study was conducted at B.A. College of Agriculture, Anand (Gujarat) in order to study the perception of agriculture students towards the RAWE Programme. All the 50 Students of B.Sc. (Ag.) fourth year who have successfully completed their RAWE programme during the year 2021-2022, were selected purposively for the study. The data were obtained through well-structured questionnaire. The findings clearly shown that majority of the students were having high level of perception on RAWE Programme. The result of the study also shown that variables namely age, family background, OGPA, Parents Income, Parents Education, Mass media exposure, Communication Skill, Leadership Skill and Diagnostic Skill were significant whereas gender was not found to have any relationship with perception of students on RAWE programme. Regarding profile characteristics of RAWE students the findings of study showed that the majority of RAWE students were of the 22 year age group, were female, were having OGPA of Higher than 8.In conclusion, the RAWE program plays a crucial role in shaping the perception of agriculture students, providing them with valuable hands-on experiences that enrich their educational journey. This research contributes to a deeper understanding of the significance of RAWE in agricultural education and highlights the need for ongoing refinement to ensure its effectiveness in preparing future agricultural professionals.

HRD 34

Relationships with the entrepreneurial competence of inland fish farmers and their profile

P. C. Patel[1], J. D. Desai[2] and S. A. Sipai[3]

[1]and [3]Assistant Extension Educationist, DoEE, AAU, Anand

[2]Assistant Extension Educationist, SSK, DoEE, AAU, Anand

ABSTRACT

The study was conducted in the Anand districts of middle Gujarat State, with 150 randomly selected inland fish farmers as respondents. In light of the objectives, the interview schedule was prepared and respondents were interviewed either at their homes or office. The study reveals that the independent variables *viz*, age, education, scientific orientation, experience in inland fish farming, extension participation and fish farming commitment of inland fish farmers had exerted positive and significant relationships with the entrepreneurial competence of inland fish farmers and the remaining nine variables failed to show a significant relationship with their entrepreneurial competence

HRD 35

Factors influencing the career choices of students in agriculture

Kalariya Bhautik S.[1] and Hemlata Saini[2]

[1]P.G. Student, AAU, Anand

[2]Assistant Professor, Dept. of Agril. Extension and Communication, BACA, AAU, Anand

Email: bhautikkalariya.118@gmail.com

ABSTRACT

This research investigates the factors influencing career choices among university students, particularly in agricultural education. Conducted at Anand Agricultural University in Gujarat, India, the study explores variables such as gender, Grade Point Average, parental and peer pressure, students' interests, family land holdings, social responsibilities, parental qualifications, and annual income on career decisions. The study reveals a positive perception of agriculture as a lucrative and promising career path among students. Surprisingly, parental and peer pressure have limited influence on career choices, and gender does not significantly affect the decisions. However, family income, students' interests, family land holdings, social responsibilities, parental qualifications, and annual income play a substantial role in career selection. The research emphasizes the importance of career guidance and counseling in helping students make informed decisions. The study recommends government support, including grants for agricultural graduates, and highlights the need for ongoing career exploration and skills development. These findings have implications for policymakers, educators, and career counselors, providing insights to enhance support for students in career decision-making.

HRD 36

Interpersonal conflict and its management among scientists of Krishi Vigyan Kendras of Gujarat

G. K. Bhabhor[1] and S. R. Patel[2]

[1]Scientist, KVK, AAU, Dahod 389160

[2]Principal, Collage of Agriculture, AAU, Jabugam

Email: gaurangbhabhor890@gmail.com

ABSTRACT

Conflict is a natural, everyday phenomenon in all private and working spheres. It is an interactive process manifested through incompatibility, disagreement or dissonance within or between social entities i.e. individual, group, organization etc. Like any other organization, Krishi Vigyan Kendra also can be no exception to the fact of existence of conflicts among their scientists. For effective functioning of the KVK, there is a need to know the interpersonal conflict existing among its scientists and its management styles adopted by them. For this investigation, all the 30 KVKs of Gujarat were purposively selected and 3 to 5 scientists from each KVK were selected randomly making total sample of 120 scientists for the study. Majority of them had medium to low level of interpersonal conflict with their superiors and colleagues; while with their subordinates had medium to high. Overall extent of interpersonal conflict was medium to low. Collaboration and accommodation were found to be the dominant conflict management approaches among the KVK scientists.

HRD 37

Crucial elements of emotional intelligence: A comprehensive analysis

B. J. Sangada[1], R. D. Pandya[2] and V. N. Parmar[3]

[1] Assistant Professor, PIA, NAU, Vyara

[2] Retd. Principal & Dean, NMCA, NAU, Navsari

[3] Principal, PIA, NAU, Vyara

Email: bhishman.sangada@nau.in

ABSTRACT

Emotional Intelligence (EI) stands as a cornerstone of achievement in both personal and professional spheres. This research paper embarks on an extensive exploration of the fundamental constituents of EI and their profound relevance across diverse facets of life. The study delves comprehensively into 15 pivotal elements of EI, spanning the spectrum from positive outlook and trustworthiness to organizational skills contributes significantly to personal growth, effective communication, and successful relationships. Cultivating these elements not only enhances individual well-being but also plays a pivotal role in leadership, teamwork, and conflict resolution. Each of these elements undergoes meticulous scrutiny, shedding light on their far-reaching effects on individual well-being, interpersonal relationships, leadership abilities, and overall effectiveness in various pursuits. Furthermore, the paper delves into the pragmatic implications of honing these elements and offers practical recommendations to empower individuals in enhancing their emotional intelligence.

HRD 38

Training needs of inland fish farmers in Navsari district of Gujarat

R. D. Dhandhukia[1], R. B. Makwana[2] and M. R. Bhatt[3]

[1]Assistant Professor, COA, Bharuch, NAU, Navsari

[2]M.Sc. student, N.M.C.A., Navsari

[3]Associate Professor, COA, Bharuch, NAU, Navsari

Email: rakesh.dhandhukia@gmail.com

ABSTRACT

Training helps farmers to incorporate the latest scientific advances and technology tools into their farming operations. Training improves not only the skill but also attitude and know-how of the trainees. Fisheries in India are a very important economic activity and a flourishing sector with varied resources and potentials. Only after the Indian independence together with agriculture it has been recognized as an important sector. The present study entitled "Training needs of inland fish farmers in Navsari district of Gujarat" was conducted in Navsari district of Gujarat, with a sample of 120 respondents. The ex-post facto research design was used for the research study. Regarding overall training need the majority of the respondents had medium to high level of training needs about inland fish farming. In case of seven types of skills in main area of training needs, "Insect and disease management" ranked as 1st followed by "Selection of quality seed and species and stoking density" 2nd rank, "Water quality management" 3rd rank, "Feed and fertilizer management" 4th rank. Other important areas like "Construction of Pond", "Harvesting, preservation and marketing of fish productfi and "Preparation of pond" received rank 5th, 6th and 7th, respectively.

HRD 39

A study on relationship between selected characteristics and attitude of agro-input dealers towards their occupation

G. N. Thorat[1], Dhruv Patel[2] and J. K. Patel[3]

[1]Assistant professor, Institute of Distance Education Anand, AAU, Anand-388110

[2]M.Sc. Scholar, Dept. of Agricultural Extension and Communication, AAU, Anand-388110

[3]Director, Extension Education Institute, AAU, Anand-388110

Email: dp.nnzz@gmail.com

ABSTRACT

In India, Agro-input dealers play a crucial indirect role in enhancing farm productivity and income. Due to their locational advantage and easy accessibility, they serve as important sources of agricultural information, offering guidance on technologies, recommendations, and input supply, contributing to farmers' decision-making processes. This study examines the relationship between specific characteristics and the attitudes of agro-input dealers towards their occupation. The study carried out in Anand district which is located in the middle Gujarat with the use of Ex-post-facto research design. A questionnaire-based proportionate random sampling survey was conducted on 120 agro-input dealers in Anand district of Gujarat state. The statistical measures, such as SPSS and Microsoft excel were used and results shows out of fifteen independent variables, twelve variables *viz*., education, annual income, extension contacts, mass media exposure, economic motivation, market orientation, credit orientation, scientific orientation, management orientation, experience as input dealer, training received and social participation showed positive and significant relationship with their attitude towards occupation. Whereas, age, size of family and input supply ability failed to show any significant relationship with their attitude towards occupation. In step wise regression shows all the independent variables together had contributed 55.70 per cent variation and these independent variables viz. scientific orientation, market orientation and credit orientation accounted for 51.50 per cent variation in explaining attitude towards occupation. Also in path analysis direct and indirect effects results shows market orientation was exerted highest direct as well as substantial indirect effect, where scientific orientation was exerted highest indirect effect on attitude of agro-input dealers towards their occupation. The study results can be taken into account to make necessary reforms by the policymakers.

HRD 40

Attitude of farmers towards agro service centers in Bharuch district

Netravathi, G., A. J. Akabari and H. U. Vyas

Department of Extension Education, College of Agriculture, Bharuch, NAU

ABSTRACT

A study on attitude of farmers towards agro service centres was carried out in Bharuch district of Gujarat during 2021-22. The number of respondents for the study was 120. The data were collected by personal interview method. For present study *Ex-post-facto* research design was used. The study was conducted in the Bharuch District which was selected purposively. It comprised of nine talukas. Out of these, two talukas *viz.,* Bharuch and Ankleshwar were purposively selected. Simple random sampling technique was used for select the respondents. The collected data were analysed by using appropriate methods of statistics *viz.,* frequency, percentage, mean, standard deviation, correlation coefficient *etc.* The results showed that majority of farmers were in middle age group with high school education. They had farming and animal husbandry as their main occupation and annual income in between 1, 50,000 to 2, 00,000. They also had semi-medium land size, medium level of extension participation, social participation as membership in more than one organization, medium level of mass media exposure, risk orientation and knowledge regarding agro service centres. Majority of the respondents were having favourable attitude towards agro service centres followed by had highly and less favourable attitude, respectively. In the correlation analysis it was

found that occupation, mass media exposure and level of knowledge had positively highly significant correlation with attitude of farmers towards agro service centres. While education, annual income, land holding, extension participation, social participation and risk orientation were positively significant associated, where age was negatively significant correlated with attitude of farmers towards agro service centres. Majority of the respondents were facing constraints related to ranked as (I) Agro service provider can't solve all the problems of farmers, (II) Inadequate finance for purchasing inputs, (III) Lack of knowledge of hybrid and improved variety, (IV) Agro service provider did not display rate lists of agricultural inputs and (V) Insufficient guidance by agro service provider about application of pesticide. Majority suggestions given against each constraint were as follows; ranked as (I) To provide technical information regarding agricultural practices, (II) Facilitate credit support for purchasing inputs, (III) Training facility should provide through private agencies, (IV) Punctuality in providing agro services, (V) Farmers insist on taking authentic bill from agro service provider and (VI) Timely supply of inputs by agro service provider.

HRD 41

Camel-based ecotourism model: An emerging business concept in Rajasthan and Gujarat

S. Rakshit[1], R. K. Sawal[2], A. Sahoo[3], Ved Prakash[4], S. S. Choudhary[5] and P. Gautam[6]

[1]Scientist, [2]Principal Scientist, [3]Director, [4]Senior Scientist, ICAR-National Research Center on Camel, Bikaner, Rajasthan

ABSTRACT

The total Camel population in the country was 2.5 Lakhs in 2019 as per the last livestock Census. Out of 2.5 lakh, 2.13 lakh (about 85.2 %) were in Rajasthan. Most of the camels are available in Jaisalmer, Bikaner, and Barmer districts of west Rajasthan. But there is a drastic reduction in the camel population. The 20th census in 2019 has reported about 37.05 % decrease in camel population in comparison to the 19th livestock census in 2012. Male camel has decreased to 80 Thousand (about 56.40 % decreases). Female camel has decreased to 1 lakh 70 Thousand about a 19.46 per cent decrease. One of the major reasons behind this situation is that we have considered the camel only as a draft animal. Camel also has very good potential other than drawing heavy loads. The camel rearers can get economic benefits from camel-based ecotourism through utilizing camel for entertainment activities, milk and camel-based bi-products. Among the different entertainment utilities, camel safari, camel race, camel polo, camel dance, camel hair cutting, etc. are more common in India. Tourists also have a craze and curiosity about camel milk due to its unique properties and therapeutic value. Camel milk contains low-fat and high minerals and vitamins. It is proven beneficial against type 1 diabetes, tuberculosis, hepatitis C, autism in children. Different by-products are made from camel hide, camel bone and camel hair. There are huge opportunities in developing camel-based eco-tourism in the desert of Rajasthan, Rann of Kutch in Gujrat, Nubra valley of Ladakh and different sea beach areas. The international camel festival of Bikaner, Pushkar Mela, and Rann Utsav of Kutch, Gujarat are some major celebrations for camel tourism. The entrepreneur associated with camel-based tourism should have knowledge about tourist choice, satisfaction and safety, quality of products, health and behaviour of camel, and networking with the people involved in tourism.

HRD 42

Entrepreneurial competency of the farmers growing betel vine in Palghar district

H. V Borate and P. A. Sawant

Department of Extension Education, DBSKKV, Dapoli

Email: hemantborate2006@gmail.com

ABSTRACT

Entrepreneurship development is concerned with the growth and development of people towards high

level of competency, creativity and fulfilment. The study intended to assess the entrepreneurial competency of farmers growing Betel vine (*Piper betel*) in Palghar district of Konkan region of Maharashtra. The sample consisted of fifty betel vine farmers selected randomly from two villages of the same district namely, Mahim and Kelve. The list of the farmers was obtained from Mahim and Kelve Pan Utpadak Co-operative Society. Data was collected with using an interview schedule specially developed for the study. Average age of the respondents was 64 years, whereas average education was 11th standard. Respondents had 0.47 ha. of land under Betel vine with average income of Rs. 1.58 lakhs. 50.00 per cent of the growers had knowledge of at least two languages. 66.00 per cent of the respondents had only farming as their family occupation. In the case of computer exposure, majority of the respondents fall under low category, while majority of the respondents had medium category of risk orientation and agricultural business anxiety. Entrepreneurial competency of the given farmers was measured under thirteen dimensions *viz.,* initiatives, activism, persistence, information seeking behaviour, job excellence and commitment to work contract, planning orientation, tackleness, self-confidence, assertiveness, persuasion and use of influence strategies. Majority of the farmers belonged to medium category in all these aspects. 78.00 percent of the respondents had medium level of overall entrepreneurial competency.

HRD 43

Profile of agro-input dealers in Anand district of Gujarat

Dhruv Patel[1], G. N. Thorat[2] and J. K. Patel[3]

[1]M. Sc. Scholar, Dept. of Agricultural Extension and Communication, AAU, Anand

[2]Assistant Professor, Institute of Distance Education Anand, AAU, Anand

[3]Director, Extension Education Institute, AAU, Anand

ABSTRACT

This study was conducted to measure the selected characteristics of agro-input dealers in Anand district which is located in the middle Gujarat with the use of Ex-post-facto research design. A questionnaire-based proportionate random sampling survey was conducted on 120 agro-input. The statistical measures, such as SPSS and Microsoft excel were used and results shows Majority of the respondents belonged to middle age group having graduation and above to higher secondary level of education, belonged to medium size of family with medium to high annual income and having experience of 10.01 to 15 years and above as input dealer and they selling more than two types of inputs, had membership in one organization with medium to high level of extension contacts, and medium to high mass media exposure and they received more than one training. Further, high economic motivation, high market orientation, high credit orientation had higher management orientation and higher level of scientific orientation too. Major problems faced by them were debit behavior of farmers, insufficient subsidies for startup as input dealer, non-availability of quality seeds, short supply of inputs in critical time, high cost of inputs, Shortage of time to go for field visits on farmers' request. The study results can be taken into account to make necessary reforms by the policymakers.

HRD 44

Relationship between characteristics of the date palm growers and their entrepreneurial behaviour

R. J. Patel[1] and R. R. Prajapati[2]

[1]Ph. D. Scholar, Dept. of Agricultural Extension and Communication, CPCA, SDAU

[2]Associate Professor, College of Agriculture, SDAU, Tharad- 385575

ABSTRACT

Date palm (*Phoenix dactylifera L.*) is one of the oldest cultivated horticultural crops of the world. Date palm is one of the important arid fruit crops of Gujarat and very popularly known as 'Kalpavruksh of Kutch'. The present study was conducted in Kutch district of Gujarat state as the district ranks first so far the area and

production under date palm is concerned. four talukas viz., Mundra, Anjar, Mandvi and Bhuj were selected purposively as they occupy more than 90 per cent area of date palm in the district. Five villages having date palm cultivation were selected randomly. A list of farmers cultivating date palm since last three years was prepared. From the village wise list, twelve farmers were randomly selected to make a sample size of 240 date palm growers. Ex-post facto research design was used for the study. The data were collected by personal contact method with help of structured interview schedule and data were coded, classified, tabulated and analyzed in the light of objectives. Fifteen independent and one dependent variables were selected for study. The independent variables *viz*., are under date palm cultivation, annual income, social participation, extension participation, management orientation, innovativeness, progressiveness, knowledge of improved date palm production technology and extent of adoption had positive and highly significant correlation with entrepreneurial behaviour. Whereas, education, land holding and mass media exposure had positive and significant correlation with entrepreneurial behaviour. Yield index had negative and significant correlation with entrepreneurial behaviour. On the other hand, age and family size had non significant relationship with entrepreneurial behaviour.

HRD 45

Scale to measure attitude of agro-input dealers towards their occupation

Dhruv Patel[1], G. N. Thorat[2] and J. K. Patel[3]

[1]M. Sc. Scholar, Dept. of Agricultural Extension and Communication, AAU, Anand

[2]Assistant Professor, Institute of Distance Education Anand, AAU, Anand

[3]Director, Extension Education Institute, AAU, Anand

Email: dp.nnzz@gmail.com

ABSTRACT

In India, Agro-input dealers play a crucial indirect role in enhancing farm productivity and income. Due to their locational advantage and easy accessibility, they serve as important sources of agricultural information, offering guidance on technologies, recommendations, and input supply, contributing to farmers' decision-making processes. This study was conducted to develop valid and reliable statements to be used for measuring attitude of agro-input dealers towards their occupation. The scale product method to develop the scale. This method is a combination of Likert and Thurston technique. 28 statements were assessed by 50 judges on a 5 point continuum. Then, 16 statements were selected to form a scale to measure attitude towards occupation. The reliability coefficient (r) was determined to be 0.86 (reliable). A questionnaire-based proportionate random sampling survey was conducted on 120 agro-input dealers in Anand district of Gujarat state. The statistical measures, such as SPSS and Microsoft excel were used and nearly two-third (67.50 per cent) of the agro-input dealers had favourable attitude towards their occupation.

HRD 46

A progressive dairy farmer in Movasa village - A case study

S. J. Jadav[1] and V. M. Chaudhary[2]

[1]Dairy Vigyan Kendra, SMC College of Dairy Science, Kamdhenu University, Anand, Gujarat

[2]PG student, Department of Veterinary & A.H. Extension, College of Veterinary & A.H., Anand

Email id: sanjay.jadav89@gmail.com

ABSTRACT

This case study delves into the inspiring journey of Patel Krunalbhai Ambalal, a dynamic dairy farmer hailing from Movasa village in the Santrampur taluka of Mahisagar district. With a background in Mechanical Engineering and a deep-rooted commitment to scientific dairy practices, Patel Krunalbhai Ambalal has transformed his family's dairy farming enterprise into a profitable and sustainable venture. The case of Patel Krunalbhai Ambalal illuminates the potential of combining education, innovation, modern

practices, and dedication to create a thriving and profitable dairy farming business. Through prudent investments in infrastructure, technology, and workforce management, he has transformed his family's dairy enterprise into a model of success, inspiring both his local community and the broader agricultural sector.

HRD 47

Dairy farmers' consciousness towards rabies

J. Jadav[1], J. K. Patel[2] and V. M. Chaudhary[3]

[1]Dairy Vigyan Kendra, SMC College of Dairy Science, Kamdhenu University, Anand-388110,
[2]Extension Education Institute, Anand Agricultural University, Anand, Gujarat
[3]PG student, Department of Veterinary & A.H. Extension, College of Veterinary & A.H., Anand
Email id: sanjay.jadav89@gmail.com

ABSTRACT

The study was emphasized to know the consciousness level of dairy farmers about rabies disease as an oldest zoonosis. Zoonotic diseases are caused by germs that spread between animals and human. Consciousness is a term used to describe the awareness of one's physical and mental experience. The total 180 farmers from 36 villages of 6 talukas of Panchmahals and Mahisagar districts of Gujarat state (India) were selected by using the simple random sampling method. The majority of farmers had medium to high level of knowledge (72.22%), high to very high level of sensitivity (91.11%), and favorable to most favorable attitude (95.55%) towards the control of rabies. The majority of farmers (90.56%) had high to very high level of consciousness about rabies. Maximum positive direct effect had exerted by scientific orientation and mass media exposure, and economic motivation & extension participation exerted maximum indirect positive effects with help of Path analysis. Farmers can enhance their consciousness about rabies through participation in different extension activities with using mass media, internet and other psychological variables. This will be useful to researchers, training institutions, planners, extension agencies and concerned organizations in the formation of effective realistic training programmes to impart consciousness amongst the farmers about rabies disease.

HRD 48

Data-driven insights into the symbiosis of human resource development and entrepreneurial development

Neeta Khandelwal[1], Pragaya Dashora[2] and Simple Jain[3]

Assistant Professor
ASPEE College of Nutrition and Community Science, S. D. Agricultural University
Email: neeta.udr@sdau.edu.in

ABSTRACT

Human Resource Development (HRD) plays a vital role in enhancing employee skills and competencies, which is crucial in today's fast-paced business landscape. This abstract presents a data-driven analysis of the symbiotic relationship between HRD initiatives and entrepreneurial development, highlighting the quantifiable impacts of training programs on organizational success. Data from various industries and organizations demonstrates that strategic investments in employee training have a significant positive correlation with overall performance. Analysis reveals that employees who undergo regular and targeted training programs exhibit higher productivity levels, improved job satisfaction, and lower turnover rates. Furthermore, data-driven insights showcase that HRD initiatives incorporating entrepreneurial elements, such as fostering innovation and creativity, lead to tangible gains in market competitiveness. Noteworthy studies conducted by authoritative bodies further validate the significance of HRD programme. For instance; ILO research found that HRD programs can increase entrepreneurial productivity by up to 25%. Additionally, GEM research found that entrepreneurs who participated in HRD programs were more likely to

be successful. Furthermore, SBA research in the US showed that businesses that invested in employee training were more likely to survive and grow. Entrepreneurial development within the context of HRD goes beyond traditional skill-building. Data indicates that organizations that actively cultivate an entrepreneurial mindset among their employees experience a marked increase in the generation of innovative ideas, improved problem-solving capabilities, and a higher propensity for risk-taking. These factors translate into enhanced adaptability, a critical asset in today's rapidly changing business environment. In conclusion, the data-driven analysis presented here reaffirms the value of HRD through training and entrepreneurial development in modern organizations. The quantifiable benefits, including increased employee satisfaction, innovation, and financial performance, underscore the significance of strategic investments in HRD as a means to drive sustainable growth and success in today's dynamic business landscape.

HRD 49

Constraints in training programmes as perceived by extension personnel and suggestions for the future trainings

Baba Bhingarde[1], Sachin Sadaphal[2] and O. P. Sharma[3]

[1]Assistant Professor, Directorate of Extension Education, MPKV, Rahuri, Maharashtra

[2]Assistant Professor, Communication Centre, MPKV, Rahuri, Maharashtra

[3]Professor and Head, Department of Extension Education, N.M.C.A., NAU, Navsari, Gujarat

ABSTRACT

The study was framed to identify the constraints in training programmes as perceived by Extension Personnel and to suggest the future training strategy for Extension Personnel. Total 210 extension personnel were selected as respondents from KVKs and Line department from seven districts of South Gujarat ie. Navsari, Valsad, Surat, Tapi, Narmada, Bharuch and TheDangs. List of 26 training constraints were selected with the help of extension scientist, training experts and review of literature. Extension personals were asked to rank these training constraints as per the constraints intensity. From the study it was found that out of twenty six constraints as perceived by the extension personnel during training programmes; “The course content of the training programmes is not updated according to the need of the hour”, “Lack of appropriate weightage to exposure visits during training programme”, “Lack of punctuality among trainers during training sessions”, “Delayed financial and other sanctions by the employer regarding training programme” were reported as major perceived constraints by the extension personnel. Out of twenty six suggestions given by extension personnel for framing the future training strategy; “Appropriate demonstration material should be used in training programmes”, “The seasonal and need based content should be incorporated in training programmes”, “The palatable and easily understandable language should be used by the resource persons during training programmes”, “The training programmes should be considered as means of capacity building by the extension personnel” and “Course content should be designed as per the time duration available for training programme” were reported as major suggestions by the extension personnel. The constraints as perceived by the respondent extension personnel and suggestions for future training strategy for the extension personnel may be taken into consideration in priority while planning and execution of training programmes for extension personnel.

HRD 50

Fostering future scientists: Assessing agricultural research satisfaction

Anusha Velamuri[1] and Katiki Srikar[2]

[1]Ph. D. Research Scholar, AAU, Anand, Gujarat, India- 380001

[2]Ph. D. Research Scholar, Central Agricultural University (Imphal), Umiam, Meghalaya, India

Email: anushaaext@gmail.com

ABSTRACT

Scientific advancements can only happen when these postgraduate students become future scientists, for which educational institutions play a massive role. *Research satisfaction* was operationally defined as a positive feeling about one's research resulting from evaluating its characteristics. To quantify it, the Research Satisfaction Scale (RSS) was used, to which 100 master's and doctoral students responded via questionnaire. The results calculated in SPSS highlighted that nearly two-thirds of the respondents had medium research satisfaction. About 58.00 per cent strongly agreed with the crucial role of infrastructure availability in their research process, 64.00 per cent of respondents marked the prior allotment of a research topic as their choice and insufficient time allocation for research activity. The suggestions offered by the respondents for enhancing the research activity of agriculture master's and doctoral students were funding for research work (78.4%), collaboration between departments or institutes (75.3%), and practical problem-solving research (71.1%). The results display an overall assessment of agriculture research activities, which is essential for developing strategic measures by SAUs and ICAR for strengthening higher education.

Committees for National Seminar SEEG – 2023
On
Innovative Agricultural Extension Approaches for Holistic Development of Farming Community
6-7 January, 2024

Sr. No.	Committee Member	Status
1.	**Central Coordination Committee**	
1	Dr. C. M. Muralidharan, DoR	Chairman
2	Dr. A. G. Patel, DEE	Co-Chairman
3	Dr. P. T. Patel, Registrar	Member
4	Dr. K. P. Thakar, DSW	Member
5	Dr. C. K. Patel, ADR & Director IT	Member
6	Dr. S. D. Solanki, Dean, CPCA	Member
7	Dr. B. G. Patel, Dean, ACNCS	Member
8	Dr. V. M. Modi, Dean, CREEE	Member
9	Dr. R. L. Meena, Dean, CoA, Tharad	Member
10	Dr. J. J. Dhaduk, Dean, CFT	Member
11	Dr. H.S. Bhadauria, Dean, CBSH	Member
12	Dr. Piyush Verma, Dean, CoH, Jagudan	Member
13	Vikram Solanki, TO	Member
14	Dr. D. B. Patel, I/c Prof. & Head, Deptt. of Agril. Ext. & Communication, CPCA	Organizing Secretary
2.	**Invitation & Reception Committee**	
1	Dr. A. G. Patel	Convener
2	Dr. F. K. Chaudhary	Co-convener
3	Dr. M. A. Tunvar	Member
4	Dr. Jignesh R. Patel	Member
5	Dr. N. A. Patel	Member
6	Dr. Pankaj Chaudhary	Member
7	Dr. K. J. Kugasiya	Member
3.	**Accommodation Committee**	
1	Dr. S. D. Solanki	Convener
2	Dr. H. S. Bhaduria	Co-convener
3	Dr. V. V. Prajapati	Member
4	Mr. Aniket R Deshpande	Member
5	Mr. P. H. Rabari	Member
6	Er. Alok Gora	Member
7	Dr. L. R. Dubey	Member
8	Mr. Abhishek Jesthi	Member
4.	**Registration Committee**	
1	Dr. P. T. Patel	Convener
2	Dr. G. R. Patel	Co-convener
3	Dr. Ankit Patel	Member
4	Dr. Hardik Dodiya	Member

	5	Mr. V. P. Prajapati	Member
	6	Mr. Sunil Joshi	Member
	7	Mr. Dinesh D. Chaudhary	Member
	8	Jivanji Thakor	Member
5.	**Food and Refreshment Committee**		
	1	Dr. R. S. Jaiman	Convener
	2	Mr. D. N. Tejani	Co-convener
	3	Dr. Janak R. Patel	Member
	4	Dr. Ankit Patel	Member
	5	Dr. Kunjal Patel	Member
	6	Mr. B. C. Patel	Member
	7	Mr. Ashish Chaudhary	Member
6.	**Stage and Decoration Committee**		
	1	Dr. P. C. Joshi	Convener
	2	Dr. M.V. Patel	Co-convener
	3	Mr. S. B. Patel	Member
	4	Dr. V. R. Wankhade	Member
	5	Mr. C. J. Joshi	Member
	6	Dr. Sarita Sanwal	Member
7.	**Announcement Committee**		
	1	Dr. C. B. Modi	Convener
	2	Mr. C. J. Joshi	Co-convener
	3	Dr. Pragya Dashora	Member
	4	Dr. Seren Shekhar	Member
8.	**Certificate and Memento Committee**		
	1	Dr. P. S. Patel	Convener
	2	Dr. S. P. Pandya	Co-convener
	3	Dr. D. B. Patel	Member
	4	Dr. G. K. Chaudhary	Member
	5	Dr. N. B. Patel	Member
	6	Dr. Soumya C.	Member
	7	Dr. N. V. Soni	Member
	8	Mr. R. N. Patel	Member
9.	**Publication Committee**		
	1	Dr. C. M. Muralidharan	Convener
	2	Dr. D. B. Patel	Co-convener
	3	Dr. A. G. Patel	Member
	4	Dr. K. P. Thakar	Member
	5	Dr. S. P. Pandya	Member
	6	Mr. Aniket R. Deshpande	Member
	7	Mr. Arnab Biswas	Member
	8	Dr. J. K. Patel (Ext.)	Member
	9	Mr. R. N. Patel	Member
10.	**Abstract and Lead paper reviewer committee**		
	1	Soumya C.	Theme I
	2	Dr. Serene Shekhar and Dr. Pragya Dashora	Theme II
	3	Dr. J. J. Mistry	Theme III

	4	Dr. Neeta Khandelwal	Theme IV
	5	Dr. J. K. Patel and Mr. R. N. Patel	Theme V
	6	Dr. S. P. Pandya and Dr. Hardik Dodiya	Theme VI
11.	**Technical Session and Hall Arrangement Committee**		
	1	Dr. V. V. Prajapati	Convener
	2	Dr. J. J. Mistry	Co-convener
	3	Dr. R. R. Prajapati	Member
	4	Mr. R. C. Prajapati	Member
	5	Dr. P. B. Marviya	Member
	6	Dr. Veeresh Hatti	Member
	7	Mr. Aniket R Deshpande	Member
	8	Mr. Arnab Biswas	Member
12.	**Poster Session Committee**		
	1	Dr. K. P. Thakar	Convener
	2	Dr. J. K. Patel (Ext.)	Co-convener
	3	Mr Nirav Joshi	Member
	4	Dr. V. M. Patel	Member
	5	Dr. H. N. Zala	Member
	6	Dr. N. V. Soni	Member
13.	**Videography and Photography Committee**		
	1	Dr. C. K. Patel	Convener
	2	Dr. M. A. Tunvar	Co-convener
	3	Dr. N. V. Soni	Member
	4	Dr. V. R. Wankhade	Member
14.	**Seating Arrangement Committee**		
	1	Dr. S. P. Pandya	Convener
	2	Mr. D. B. Patel	Member
	3	Mr. Nitesh Medat	Member
15.	**Transportation Committee**		
	1	Dr. B. S. Parmar	Convener
	2	Kiran D. Chauhan	Member
16.	**Press Media Committee**		
	1	Dr. A. G. Patel	Convener
	2	Dr. S. P. Pandya	Co-convener
	3	Mr. S. M. Patel	Member
	4	Dr. Sarita Sanwal	Member
	5	Dr. Hardik Dodiya	Member
17.	**Finance and Budget Committee**		
	1	Mr. M. C. Parmar	Convener
	2	Dr. D. B. Patel	Co-convener
	3	Mr. Aniket R. Deshpande	Member
18.	**Rangoli Committee**		
	1	Dr. Surbhi Singh	Convener
	2	Dr. Pragya Dashora	Member
19.	**Security and Parking Committee**		
	1	Mr. Prakashshing Vaghela	Convener
	2	Mr. Bharatbhai V. Desai	Member


Department of Agricultural Entomology
C. P. College of Agriculture
SDAU, Sardarkrushinagar
SDAU
HONEY

UNIVERSITY BHAVAN

Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar