https://doi.org/10.56572/gjoee.2024.37.2.0008 Gujarat Journal of Extension Education Vol. 37 : Issue 2 : June 24

IMPACT OF CLIMATE RESILIENT TECHNOLOGIES ON SOCIO ECONOMIC DEVELOPMENT OF TRIBAL FARMERS

R. F. Thakor [1] and P. J. Joshi [2]

1 Sr. Scientist & Head, KVK -Valsad - 396191
2 Programme Assistant, KVK -Valsad - 396191
Email: kvkvalsad@gmail.com

ABSTRACT

The National Innovations on Climate Resilient Agriculture (NICRA) project was launched by ICAR in 2011. The Technology Demonstration Component of the project which is aimed at enhancing the resilience and adaptive capacity of the farmers to cope with the increasing climatic variability in different agro- ecosystems is implemented by Krishi Vigyan Kendra's spread across the country. Since the project has completed ten years, the investigation was undertaken with the objective to analyze the impact of climate resilient technologies on socio economic development of the tribal farmers. Khuntli and Amdha villages of Kaparada block of Gujarat state was selected purposively. From the list of the beneficiaries of both villages, forty farmers from each village were selected by simple random sampling technique. Thus, the sample comprised of 80 beneficiary farmers. Ex-post facto research design was used for the study. Statistical tools viz. mean, SD, and Z test were used to analyze the data. The data related to changes occurred after implementation of NICRA project revealed that as a result of adoption of climate smart technologies, significant improvements in the livelihood of the beneficiary farmers were observed due to increase in the overall income of the farmers per annum.

Keywords: *climate resilient, income, adaptation, vulnerable*

INTRODUCTION

Climate change and its variability are emerging as the major challenges influencing Indian agriculture. Long term changes in shifting weather patterns like fluctuations in temperature, variability in rainfall patterns and rising of sea levels as a consequence of changing climate, are significantly impacting agriculture and allied activities. In India, significant negative impacts are expected in medium term (2010-2039) which is predicted to reduce yields of several crops by 4.5 to 9 per cent, which is roughly up to 1.5 per cent of GDP per annum. (Srinivas Rao Ch and et.al., 2014). To address these issues, ICAR has launched National Innovations on Climate Resilient Agriculture (NICRA) project in 100 vulnerable districts across the country to enhance climate resilient agriculture through strategic research and technology demonstrations which covers agriculture and horticultural crops, livestock -fisheries, and efficient management of natural resources. Of the four major components of the project, technology demonstration component (TDC) was implemented by the Krishi Vigyan Kendra's in different agro-climatic zones. Gujarat is one of the vulnerable states of the country where the project is being implemented. Three districts of Gujarat state i.e. Valsad, Kutch and Rajkot were selected for piloting the NICRA project.

OBJECTIVE

To analyze the impact of climate resilient technologies on socio economic development of the tribal farmers before and after implementation of the NICRA project.

METHODOLOGY

Valsad - the tribal dominated district is well known for its extreme events like heavy rainfall (av. 2200 mm/ year), erratic rainfall, long dry spell, flood, water logging etc. resulting in drastic reduction in yield and thereby severely impacting livelihood of tribal farmers of the district. Gujarat Vidyapith KVK-Valsad had demonstrated several climate smart technologies on farmers' fields under NICRA project.

The study was therefore, undertaken to analyze the impact of technologies on socio economic development of the tribal farmers. Three most important climate resilient technologies which are being adopted by large number of farmers in the villages such as flood tolerant variety of paddy, and farm pond were identify for study. Khuntli and Amdha villages of Kaparada block was selected purposively as the project has been implemented in these villages. The respondents for the study were the farmers who have adopted these technologies. From the list of the adopters of these technologies in both the villages, forty farmers from each

village were selected by simple random sampling technique. Thus, the sample comprised of 80 farmers selected from two villages. Ex-post facto research design was used for the study. Data was obtained by administering semi-structured interview schedule. Statistical tools such as frequency, percentage, mean, standard deviation, and "Z" test were used to analyze the data.

RESULTS AND DISCUSSION

Flood tolerant variety of paddy

Late monsoon with moderate wind velocity at harvesting stage of paddy caused more damage to the crop; as it lodged in the field. This is because the varieties grown by the farmers are susceptible to water logging. Due to high humidity, the seeds that came into contact with soil got germinated. Quality of paddy straw also deteriorated, which was intensively used as cattle feed. KVK demonstrated high yielding, short duration, dwarf, and pests and diseases and water logged resistant paddy varieties. Data presented in Table 1 revealed that the technological intervention, flood tolerant variety of paddy gave higher yield under water logged conditions and thus average net profit to the tune of Rs 29570/ha had been realized by the farmers during the rainy season as against Rs. 17,874/ha when practicing with water logging susceptible cultivar of paddy.

Table 1: Impact of flood tolerant variety of paddy (n=80)

Technology	Variety	Av. Grain yield (Kg/ha)	Av. Straw yield (Kg/ ha)	Gross cost Rs./ha	Gross returns Rs./ha	Net returns Rs./ha	B:C Ratio
Improved water logging resistant variety	MTU-1010	4040	4083	32600	64526	30926	1.97
Improved water logging resistant variety	GAR-13	3610	4318	31972	59176	27204	1.97
Improved water logging resistant variety	NAUR-1	3861	4531	32538	63116	30578	1.90
Farmers practices (control)	Jaya	3105	2852	31300	49174	17874	1.57

Farm pond technology

The productivity of different crops become uncertain due to untimely setting of monsoon and prolonged breaks during the monsoon season. The use of harvested water improved the productivity of crops by providing opportunity for supplemental irrigation at critical stages of crop growth. Before introduction of NICRA intervention (across the slope excavation of farm pond) farmers were not aware of the concept of digging farm ponds for rain water harvesting .Four farm ponds were dig out with partial contribution of farmers during first year of the project. On an average the farm pond was 30 ft long, 30 ft wide and 7 ft deep with 1:3 side slope. Each farm pond having water storage capacity of approx. 1,80,000 Iiters.

Table 2: Impact of farm pond technology on yields and returns from various crops (n=80)

Treatments	Crop	Yield Kg/ha.	Stages of irrigation	Climatic condition	Gross Cost (₹/ha.)	Gross income (₹/ha.)	Net income (₹/ha.)	B:C ratio
Farmers practice (Non- availability of water)	**Paddy**	2852	No irrigation	Long dry spell Moisture stress	32180	49256	17076	1.53
Use of Farm pond water	**Paddy**	3610	Nursery raising	Long dry spell Moisture stress	30888	62963	32075	2.04
Farmer's practice (Non-availability of water)	**Bottle gourd**	19421	No irrigation	Long dry spell Moisture stress	67665	155368	87703	2.29
Use of Farm pond water	**Bottle gourd**	23620	Flowering	Long dry spell Moisture stress	61767	188960	128193	3.05

Data in table-2 clearly indicates that in both the crops, the gross income increased considerably with minimal increase in the cost of cultivation. Before introduction of the technology the crop at different stages of growth faces extreme moisture, stress resulting in to poor yield especially during the period of long dry spell. Supplemental irrigation using harvested water from farm pond helped the crop in escaping the stress period thus reducing the adverse impact on growth. This enabled farmers to save crop and harvest more.

Table-3: Distribution of respondents according to their socio- economic changes occurred before and after implementation of project (n=80)

Sr. No.	Socio Economic parameters	Category	Beneficiaries				Calculated "Z" value
			Before NICRA		After NICRA		
			No.	%	No.	%	
1	**Education**	Low	19	23.75	21	26.25	4.16**
		Medium	43	53.75	38	47.50	
		High	18	22.50	21	26.25	
2	**Social participation**	Low	22	27.50	14	17.50	3.83**
		Medium	39	48.75	37	46.25	
		High	19	23.75	29	36.25	
3	**Cropping intensity**	Low	29	36.25	16	20.00	3.51**
		Medium	33	41.25	37	46.25	
		High	18	22.50	27	33.75	
4	**Crop productivity**	Low	36	45.00	12	15.00	4.58**
		Medium	16	20.00	26	32.50	
		High	28	35.00	42	52.50	
5	**Livestock productivity**	Low	38	47.50	25	31.25	4.63**
		Medium	32	40.00	36	45.00	
		High	10	12.50	19	23.75	
6	**Cropping pattern**	Low	43	53.75	38	47.50	3.86**
		Medium	14	17.50	19	23.75	
		High	23	28.75	23	28.75	
7	**Occupation**	Only Agriculture	44	55.00	35	43.75	4.87**
		Agriculture+ livestock	25	31.25	34	42.50	
		Agriculture+ livestock+ Other	11	13.75	11	13.75	
8	**Extension participation**	Low	42	52.50	28	35.00	2.79**
		Medium	24	30.00	27	33.75	
		High	14	17.50	25	31.25	
9	**Possession of small equipment**	Low	37	46.25	34	42.50	1.97**
		Medium	27	33.75	27	33.75	
		High	16	20.00	19	23.75	
10	**Overall income**	Low	33	41.25	20	25.00	3.26**
		Medium	26	32.50	31	38.75	
		High	21	26.25	29	36.25	

** = Significant at 0.05 level of significance

The data related to changes occurred after implementation of NICRA project (Table-3) revealed that the calculated Z value was found significant indicating that there were significant changes occurred in socio economic characteristics of the adopters of technologies. Social participation and participation in extension activities of the villagers were very low before the project but it was found significantly increased after implementation of NICRA project. Similarly cropping intensity has been increased considerably after the project activities as they have many options of the technologies that provide resilience of climate changes. Introduction of custom hiring center concept more number of farmers were benefited through small equipment like thresher, power tiller, brush cutter, sprayer pump etc. enabled them to carry out timely operations in field condition. Therefore, positive changes occurred in possession of assets after project period. Due to availability of harvested water farmers started growing early mature short duration crops during Rabi season. Area under green fodder increased considerably by adopting multi cut highly nutritive perennial

fodder grass varieties. The productivity of paddy crop also increased with the adoption of water logging resistant variety. Farmers were trained in the different vocations such as livestock production, mushroom production, vermi-compost production, preservation of mango pulp. Many farmers started vocation along with farming and are earning additional income out of it. As a result of adoption of climate smart technologies demonstrated under NICRA project, change in the livelihood of the adopter farmers were observed due to increase in the overall annual income of the farmers. Findings are supported by Tajpara et. al. (2018).

CONCLUSION

This research paper summarizes the climate change mitigation and adaptation work such as introduction of flood tolerant varieties and excavation of farm pond across the slope in hilly terrain undertaken by the Krishi Vigyan Kendra to improve the crop productivity in tribal area of Gujarat state. Supplemental irrigation with harvested rainwater in farm pond, one of the climate change adaptation strategies, played an important role in reducing the risk of crop failures under moisture stress condition and during long dry spells as well as in optimizing the productivity in the dry land areas. Adoption of flood tolerant varieties of paddy accompanied with use of less expensive ecofriendly technologies such as liquid bio fertilizer, neem-based pesticides, composting farm waste by means of earth warm etc. has reduced the cost of cultivation which leads to increase the paddy productivity and overall income of the farmers as well.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

Das, Shaktiranjan and Mohapatra, Sayan Sagnika (2023) Tribal farming dynamics: Investigating the influence of socio economic and psychological attributes on agricultural information management practices. Guj. J. Ext. Edu. 36(1):57-60. https://doi.org/10.56572/gjoee.2023.36.1.0010.

Dobariya, J. B., Thesiya, N. M. and Desai, V. K. (2017). Impact of KVK activities in adopted villages of KVK-Dang. *Guj. J. Ext. Edu.,* 28(1): 28-32.

Gorfad, P.S., Thaker, J. N. and Baraiya, K. P. (2018). Impact of Krishi Vigyan Kendra in operational villages. *Guj. J. Ext. Edu.* Special Issue on National Seminar: 41-13

Jegoda, M. N., Jadav, S. J. and Patel, J. H. (2022) Socio economic profile and constraints faced by goat keepers. Guj. J. Ext. Edu. 34(1):79-85. https://doi.org/10.56572/gjoee.2022.34.1.0016.

Katole, S.B., Bhatt, J.H. and Patel, G.G. (2017). Impact analysis of activities of Krishi Vigyan Kendra. *Guj. J. Ext. Edu.* 28 (2): 267-270.

Meghwal, P. K., Singh, R. J. and Jadav, N. B. (2017). farmers' role in decision-making on adoption of mitigation and adaptation of climate change practices in agriculture. *Guj. J. Ext. Edu.* 28 (1): 172-173.

Patel, R. R., Pandya, S.P. and Patel, P.K. (2016). Characterization of farming system in North -West agro climatic zone of Gujarat state. *Guj. J. Ext.Edu.,* 27(2): 206-208.

Pise, G.K., Ahire R.D. and Kale N.D. (2018). Impact of national innovations on climate resilient agriculture project on its beneficiaries. *Int.J. Curr. Microbiol. App.Sci*. 6:2928-2932.

Rao, M.S. and Rao N. M. (2017). Impact of farm pond technology on economic development of the farmer in Khammam district of AP. Bulletin of environment, pharmacology and life science. 6(1):510-511.

Sasanka Lanka et.al. (2015). Adoption of climate resilient technologies leading to sustainable food security. *Int.j.Agric.Sci.and research.* 6:2250-57.

Srinivas Rao and et.al. (2014). Climate Resilient water practices for improving water use efficiency and sustaining crop productivity. Paper presented in national workshop on climate change and water, Walamtari, CRIDA, Hyderabad.

Tajpara M. M.; Vakaliya M. A. and Kalsariya B. N. (2018). Impact of climate resilient technology in nicra village of Rajkot district of Gujarat. *Guj. J. Ext. Edu.* Special Issue on National Seminar: 78-81.

Received : February 2024 : Accepted : May 2024