Gujarat Journal of Extension Education Vol. 34 : Issue 2 : December 22 *https://doi.org/10.56572/gjoee.2022.34.2.0015*

CHILLI PLUS MUSKMELON INTERCROPPING - AN INNOVATIVE MODULE FOR DOUBLING THE FARMERS INCOME

Y. D. Pawar[1], S. H. Malve[2] and D. A. Sadrasaniya[3]

1, 2 & 3 Krushi Vigyan Kendra, S. D. Agricultural University, Deesa - 385 535
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.

Keywords: *chilli, intercropping, muskmelon, yield, innovative module*

INTRODUCTION

Now a day's government emphasis on doubling farmer's income through innovative practices with many useful strategies which were proposed like per drop more crop; quality seeds; Soil-test based nutrient management; post-harvest crop losses; value addition; creation of a national agricultural market, removing distortions and e-platform etc.; new crop insurance scheme and promotion of ancillary activities (poultry, sericulture, beekeeping and fisheries) etc. Though the doubling farmers' income by 2022 looks quite challenging but it is needed and is attainable (Biradar *et al.,* 2015; Kumar and Chahal, 2018).

The income enhancement of farmer would come mainly from seven sources like increase in productivity of crops, adoption of allied sectors, improvement in efficiency of input use that would save cost, increase in cropping intensity at farmers' field, diversification towards high value commodities, better remunerative price realized by farmers, and shifting way unproductive labour from agriculture to nom-farm activities (Khanam *et al*. 2018). Contradictory to this, day by day land is synchronizing with increasing population. Fragmentation of land is widespread in India and it is believed that fragmented nature of land holdings may play a major role in explaining low levels of agricultural productivity.

Intercropping could be an option of assured income and also it increases productivity of crops in per unit area and per unit time. Therefore, recently intercropping has gained momentum particularly in the densely populated countries which has limited per capita land for crop production. Therefore, it is one of the techniques of vertical expansion of crop production that increase cropping intensity in developing countries like India. It increases total productivity through efficient utilization of land, labour and growth resources such as increasing utilization of solar radiation and different inputs including fertilizer and water (Ahmed *et al*., 2006). Intercropping not only reduces the risk associated with input costs but also increases profit potential (Rathi and Verma, 1979). Moreover, it provides several major advantages namely; diversification reduces risk associated with crop failure, offers greater yield stability and utilizes the available growth resources more efficiently and sustainably (Hirota *et al.,* 1995 and Islam *et al*., 2006).

Deesa Taluka of Banasknatha district is a hub of vegetable. Chilli is one of the popular crop in summer season due to favourable soil, climatic condition and better demand in market. Sole cropping of wider spacing crops is most commonly practices followed in this area and there is scope to utilize the interspaces of chilli for growing short duration vegetables like muskmelon. Particularly the chilli crop is an

erect, medium tall and compact plant with moderate branching habit could be ideal for growing inter crops (Pendam *et al.,* 2021). The morphology, growth habit, duration and wider spacing recommended for this variety enables to grow some short duration vegetable crops along with it without much adverse effect on the main crop.

Inter-specific competition may be minimized through judicious choice of crops (Santalla *et al.,* 2001). Usually plants differing in growth duration, height, rooting systems and nutrient requirements are considered to growth together in intercropping systems (Willey, 1990). Better intercrop production could be achieved with the choice of the appropriate crops (Santalla *et al.,* 2001), population density and planting geometry of component crops.

Keeping the above point in view, the study on innovative CMI module (Chilli+ muskmelon intercropping) for doubling the farmers' income conducted on farmers field using improved production technologies with an objective of enhancement of land productivity for more revenue generation through intercropping systems under actual farm situation.

OBJECTIVE

To assess the enhancement of land productivity for more revenue generation through intercropping systems under actual farm situation.

RESULTS AND DISCUSSION

Effect of intercropping module on yield and economics

METHODOLOGY

The present innovation was tested on farmer's field with three treatments: (a) Chilli + muskmelon intercropping system (1:2) (b) sole muskmelon (c) sole chilli on 0.4 ha area. For each treatment, 28 farmers were identified from selected villages (each OFT was a replication) and the selection of farmers completely based on their interest to use of technology during 2018 and 2019. The necessary steps for the selection of site and farmers, lay out of demonstration *etc*. were followed as suggested by Chaudhary (1999).

The farmers were trained with technology and package of practices provided for intercropping systems. Plastic mulching and drip irrigation systems were recommended for resource conservation. Three row hole; silver + black plastic mulch of 25 micron laid out in field with the help of tractor operated machine at 120 cm mulch row spacing with drilling of RDF and spreading of drip lateral (4 lph). Muskmelon crop were sown in 2nd week February at 30 cm spacing in both side row and chilli seedlings (hybrid) were transplanted in central hole of mulch at 45 cm spacing. Selection of hybrids was done on the basis of survivability during summer (~45^{0}C). Recommended dose on fertilizers and plant protection measures were given through soil and fertigation. Observation related to yield and productivity was taken from unit area from each plot to maintain the uniformity in observation.

Table 1: Impact of innovative technology

Technology	Crop	Average yield (q/ha)		Crop equivalent yield (q/ha)		Land equivalent ratio	
	Year	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Intercropping of Chilli+ Muskmelon	Muskmelon	290.28	302.60	373.87	364.37	1.80	1.81
	Chilli	248.58	233.75				
Traditional	Sole chilli	272.08	256.05	272.08	256.05	1.00	1.00
	Sole muskmelon	327.00	338.15	327.00	338.15	1.00	1.00

Table 2 : Economics of innovative technology

Technology	Crop	Cost of cultivation (₹/ha)		Gross return (₹/ha)		Net return (₹/ha)		BCR	
	Year	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Inter-cropping of Chilli+ Muskmelon	Muskmelon	252131	260950	1039369	1012945	787239	751995	4.12	3.88
	Chilli								
Traditional	Sole chilli	172418	180625	756369	711819	583951	531194	4.39	3.94
	Sole muskmelon	114998	121650	392400	405780	277403	284130	3.41	3.34

Note: Green chilli selling rate: ₹ 2780 per quintal and muskmelon fruit: ₹ 1200 per quintal

On farm trial of Intercropping of chilli + Muskmelon OFT in plastic mulching under drip irrigation lead to higher yield of system due to addition yield obtained from intercropped muskmelon. Muskmelon produced fruit yield of 290.28 q/ha and 302.60 q/ha in short span of time (70 days) during 2018 and 2019, respectively with availed resource provided for chilli crop. The scenario on intercropping also reported by Ahmed *et al*. (2013), Muoneke and Ndukwe (2008) and Manga *et al*. (2003).

On the other hand, main crop chilli started fruiting from 55-60 days and produced 248.58 q/ha and 233.75 q/ha of green chilli in 8-10 picking. Crop equivalent yield was 373.87 q/ha and 364.37 q/ha with land equivalent ratio (LER) 1.80 and 1.81 during 2018 and 2019, respectively. Similar results were also reported by Suresha *et al*. (2007) in different chilli based intercropping systems. In term of economics, intercropping systems 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.

The other benefit of this technology was intercropping systems reduced cost involvement for field preparation, labours for various operations, saving of mulch roll and inputs like fertilizers in same piece of land reduced the overall cost of cultivation. Saving of energy and fuel for pump operation for irrigation due to higher WUE (Sonawane, *et al*., 2020).

Wiley, (1990) considers intercropping as an economic method for higher production with lower levels of external inputs. This increasing use efficiency is important, especially for small-scale farmers and also in areas where growing season is short. Production more in intercropping can be attributed to the higher growth rate, reduction of weeds, reducing the pests and diseases and more effective use of resources due to differences in resource consumption (Eskandari, 2012); Harikrishna and Naberia (2021).

Apart from that, labor investment in traditional practices is 60% more for weeding, fertilizer application and more numbers of sprays for pest and disease. Such type of problem were minimize in intercropping practices with use of plastic mulching with drip systems and intercropping eliminated weed problem. Optimum temperature in crop microclimate causes better pollination and more fruiting. Intercropping created better microclimate in field and reduced the harsh temperature effect (~45^{0}C) on pollination of chilli during summer season.

The existing government is willing to double the farmer's income by 2022, by adopting this type of innovative technology module in farming, the time can be shorten and the target for the same can be achieved with conserving resources. As intercropping systems reduced cost involvement for field preparation, labours for various operations, saving of plastic mulch, and inputs like fertilizers in same piece of land reduced the overall cost of cultivation.

Upscaling of technology

Due to higher net return and many more advantages, technology module become a very popular in summer season among small land holding farmers and they have received more net return per unit of land. During summer 2019-20, this module was being replicated drastically and gained popularity among the farmers from Gujarat, Punjab, Maharashtra, Karnataka and Telangana state. The horizontal spread of this module on around 566.92 hectare area in within a 1 year testing. Main reason for up-scaling of this technology module in various states and Gujarat through mass media, new paper, TV channel, farmers' publicity and social media etc.

CONCLUSION

It was revealed that the CMI module (Chilli and muskmelon intercropping) (1:2) under silver+black plastic mulching with drip irrigation earned more yield per unit area and net returns as well as showed effective utilization of resources and combating abiotic stresses as compared to sole crop during summer. The other benefit of this technology was intercropping systems reduced cost involvement *viz*., field preparation, labours for various operations, saving of mulching, irrigation and inputs like fertilizers *etc*. in same piece of land.

CONFLICT OF INTEREST

No conflict of interest among researchers.

REFERENCES

Ahmed, F., Islam, M.N., Alom, M.S., Sarkar, MAI, Mannaf, M.A. (2013). Study on intercropping leafy vegetables with okra (*Abelmoschus esculentus* L.). *Bangladesh J. Agril. Res*. 38 (1):137-143.

Ahmed, F., Rahman, M.A., Jahan, MAHS, Ahmed, M. and Khayer, M.A. (2006). Effect of different planting systems in maize/ spinach-red amaranth intercropping. *Bangladesh J. Agric. Environ*. 2(2): 69-76.

Biradar Gangappagouda, Gangadharappa, N. R., Vinaya Kumar, H. M. and Shivamurthy, M. (2015).

Development and Validation of a Scale to Measure Economic Contribution of Agricultural Extension Service (ECoAES) Provided Under Karnataka Watershed Development Programme. Trends in Biosciences. 8(7): 1780-1786.

Eskandari, H., (2012). Intercropping of maize (*Zea mays*) with cowpea (*Vigna sinensis*) and mungbean (*Vigna radiata*): effect of complementarity of intercrop components on resource consumption, dry matter production and legumes forage quality. *J. Bas. and Ap. Sci. Res*. 2: 355-360.

Gomez, K.A. and Gomez, A.A. (1984). Statistical procedure for agricultural research, 2nd ed. John Willey and Sons, New York, U.S.A., pp. 241-271.

Harikrishna, Y.V. and Naberia, S. (2021). Adoption of climate resilient technologies by farmers. *Guj. J. Ext. Edu.* 32(1): 49-52.

Hirota, O, Hashem A. and Hamid A. (1995). Yield, Photosynthesis and canopy structure of maize mungbean intercropping system. *Japanese J. Trop. Agric*. 39: 168-176.

Islam, M.N., Haque M.M. and Hamid A. (2006). Planting arrangement and population density effects on the physiological attributes and productivity of maize-bush bean intercropping system. *Bangladesh J. Agril. Res*. 31(3): 353-364.

Khanam, R., Bhaduri, D. and Nayak, A.K. (2018). Crop diversification: an important way-out for doubling farmers' income. *Indian Farming.* 68(01): 31–32.

Kumar, S. and Chahal, V.P. (2018). Doubling farmers' income: possible way out. *Indian Farming.* 68(01): 95–96.

Manga, A.A., Balam M.G. and Ashafa, L.W. (2003). Evaluation of maize (*Zea mays* L.) and grain amaranth (*Amaranthus cruentus* L.) intercrop. *Nigerian J. Hort. Sci*. 8: 7-10.

Muoneke, C.O. and Ndukwe, O.O. (2008). Effect of plant population and spatial arrangement on the productivity of okra/ amaranthus intercropping system. *J. Trop. Agric. Food, Environ Extn*. 7(1): 15-21.

Pendam, R.B., Thorat K.S. and Patil R.A. (2021). Elational analysis of profile of chilli growers and technological gap. *Guj. J. Ext. Edu.* 32(1): 228-231.

Rathi, K.S. and Verma, V.S. (1979). Potato and mustard-A new companionship. *Indian Farming.* 28(11): 13-14.

Santalla, M., Rodino, A.P., Casquero, P.A. and De Ron, A.M. (2001). Interactions of bush bean intercropping with field and sweet maize. *European J. Agron*. 15: 185-196.

Sonawane, H.P., Tarde, V.J. and Walke, J.P. (2020). Elational analysis of profile of chilli growers and technological gap. *Guj. J. Ext. Edu.* 31(2): 32-35.

Suresha, B.A., Allolli, T.B., Patil, M.G., Desai, B.K. and Hussain, S.A. (2007). Yield and economics of chilli based intercropping system. *Karnataka J. Agric. Sci.* 20 (4): 807-809.

Willey, R.W. (1990). Resource use in intercropping systems. *J. Agric. and Water Manag.* 17: 215-231.

Received : October 2022 : Accepted : December 2022