Plant Archives Vol. 17 No. 2, 2017 pp. 1658-1660 *ISSN 0972-5210*

INTEGRATED CROP MANAGEMENT IN CHILLI FOR ENHANCING PRODUCTIVITY AND PROFITABILITY UNDER FARMERS CONDITION

K. S. Yadav and A. K. Tripathi

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Krishi Vigyan Kendra, Sagar - 470 002 (M.P.), India.

Abstract

The technology demonstrations were conducted at farmer's field with farmers participatory mode during *kharif* seasons of 2013 to 2016 with medium fertility status soils in Sagar district of Madhya Pradesh for popularization of improved production technology of chilli. Seed sowing of varieties VNR 209 was done in raised bed nursery with a seed rate of 0.5 kg ha-1 than planted in the fields. Balance fertilizer was applied to fulfill the nutrient requirement of the crop. IPM Practices was followed as seed and seedling treatment with *Trichoderma viride* and PSB culture, installation of pheromone trap (20/ha), Yellow sticky trap (50 No./ha), Blue sticky trap (50 No./ha.). General spray of Carbendazim + Mancozeb @ 2.5 g/lit of water was done in vegetative stage to check the foliar diseases. Regular spray of Imidacloprid at 15 days interval from 35 day after planting was given for management of sucking pest. In the improved technology mortality due to wilt reduced by 73.5 per cent in the fields and incidence of sucking pest reduced by 44.8 per cent. By the intervention of KVK, the yield of chilli was found 26.0 per cent more in technology demonstration (116 q/ha) as compared to farmers practice (92 q/ha) during the years. The additional cost Rs. 4285 per ha increased the average net return of Rs. 37535 per ha and incremental benefit cost ratio 8.75 shows higher profitability and economic viability of the technology demonstration.

Key words : Chilli, technology demonstration, frontline demonstration.

Introduction

Chilli (*Capsicum annum* L.) is an important spice crop, grown extensively in most part of the country for the both domestic and export market. It is mainly cultivated for its vegetable green fruits and for the dry chilli as the spice of commerce. It is a rich source of vitamins C, A and B. In India, it is an important cash crop. India is the largest producer (Area 743600 ha and Production 1453130 tonnes) of chillies in the world followed by China, Pakistan and Mexico. Madhya Pradesh occupies 130917 ha area with productivity of 2.86 tonnes per hectare producing 373.9 thousand tones (Anonymous, 2015). The intensive cultivation without proper crop rotation, poor crop management has led to increase in pest and disease incidence causing heavy yield loss. Out of various insect-pest and diseases; damping off disease in nursery stage, leaf curl in chilli, anthracnose are major constraints in the production of chilli and causes about 50-60 per cent losses in yield. There is potential to increase production of chilli by using improving production practices and proper plant protection measures at right time. Adoption of integrated crop management practices at proper time resulted better production as well as management of insect pest and diseases.

There is potential to increase production of chilli by using improving production practices and proper plant protection measures at right time. Adoption of integrated crop management practices at proper time resulted better production as well as management of insect pest and diseases. Technology demonstration is the most effective way to show how a thing works, how to do the work, principles involved in an operation and to show the end results of the technology/methodology adopted. The present studies were conducted at farmer's field with farmers participatory mode from 2013-2016 in the chilli cultivated area of Sagar district.

Materials and Methods

The present study was conducted during summer season of 2013, *Kharif* 2014-15 and *kharif* seasons 2016

with medium fertility status soils in Sagar district of Madhya Pradesh for popularization of improved production technology of chilli. To find out the constraints in chilli production, Participatory Rural Appraisal (PRA) technique was used. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in chilli production. Immbalance fertilizer application, no use of bio control agents, no use of plant growth regulators and indiscriminate use of pesticide at insect and disease appearance are the major constraints of lower productivity. Based on higher order problems identified, technology demonstrations were planned and conducted at the farmers' field. Each demonstration was conducted on an area of 0.50 ha and the same area adjacent to the demonstration plot was kept as farmer's practices. The package of improved production technologies included variety VNR 209, recommended dose of fertilizer were applied as basal dose and in top dressing. Seeds were treated with *Trichoderma viride* @ 10 g kg^{-1} seed for prevention of seed-borne diseases and inoculated with PSB @ 10 g kg^{-1} seed for increasing the availability of phosphorus to crop roots. Seed sowing was done in raised bed nursery and 20 days old plants transplanted in the field on raised beds. One hand weeding was done at 25 DAS for effective control of weed. For monitoring and management of sucking pest and pod borer Yellow sticky trap (50 No.), Blue sticky trap (50 No.) and Pheroman trap (20 No.) were installed. Spray of plant growth regulator Tricontanole at 45 and 80 days after planting to check the flower dropping and improve fruit setting. Foliar spray of carbendazim + Mancozeb at 35 days and regular spray of Imidacloprid 17.8 SL from flower initiation stage at 15 days interval for management of sucking insect-pest.

The data on plant height, number of branches/plant, number of fruits/plant, green chilli yield, incidence of wilt and anthracnose disease, infestation of sucking pest and pod borer were recorded from vegetative to crop harvest stage. The cost of cultivation, gross monetary return and benefit cost (B: C) ratio were calculated based on current market price. In addition to this, data on farmer practices were also collected from the equal area. The benefit cost (B:C) ratio was calculated based on gross return. The incremental benefit cost ratio was calculated on the basis of additional cost of cultivation and additional net returns.

Results and Discusson

Seed and seedling treatment with *Trichoderma viride* and PSB @ 10 gm/lit of water reduced the occurrence of wilt disease. The average incidence of wilt was 3.5 per cent in improved technology as against 13.3 per cent in farmer's practices. Results are in accordance with the study of Singh (2007), who also reported moderate effect of *T. viride* and *T. harzianum* against chilli wilt in Himachal Pradesh. Installation of yellow sticky trap, blue sticky trap, pheroman trap and spray of Imidacloprid 17.8 SL were reduced the population of pod borer and sucking pest like white fly, thrips etc, which ultimately check the infection of leaf curl disease during the years. Overall reduction of sucking pest incidence was found 15.6 to 8.6 per pant. Yellow sticky traps are very effective to check the further spread of white fly (Rao *et al*., 1991). The superiority of Imidacloprid in controlling the sucking pest were also reported by Raj and Parihar (2003) and Pandey *et al*. (2010), they reported that the spray of imidacloprid 17.8 SL for checking the vector of leaf curl disease of chilli resulting minimum disease incidence (14.81%) and reduced maximum per cent disease infestation than the other treatments.

Chilli needs to absorb more nutrients *i.e.* 3-3.5 kg N, 0.7-1 kg P and 5-6 kg K to produce one tonne of dry matter or fruit yield. The amount of nutrients taken up by these crops depends on the number of fruit and the amount of dry matter produced. The proper application of nutrients and management of crop enhances the plant height, number of branches and productivity of chilli under technology demonstration plots. The number of fruits was increased in technology demonstration as 226 to 344 per plant in comparison to farmers practice. Application of N in four splits at 30-day intervals has been recommended. Subhani *et al*. (1990) to achieve maximum yields and profits in chili production. He obtained the highest yield of chili when both N and K were applied in four splits at planting, 30, 60 and 90 DAT. Spray of tricontanol increases the fruit setting, which ultimately increased the yield of chilli as also reported by Chaudhary *et al*. (2006). The yield of chilli was found 26.0 per cent more in technology demonstration (116 q/ha) as compared to farmers practice (92 q/ha).

The economic viability of improved production technologies over farmer's practices was calculated depending on prevailing prices of inputs and output costs. Different variables like seed, fertilizers, IPM material and pesticides were considered as cash input for technology under trails as well as farmers practice. It was found that average cost of cultivation of chilli under improved technologies was 47615 per ha in all the years over farmers practice, which was 43330 per ha. The additional cost Rs. 4285 per ha increased the average net return of Rs. 37535 per ha in the improve technologies was mainly due to more cost involved in balanced fertilizer application, application of *Trichoderma viride* and PSB,

Table 1 : Disease, insect-pest incidence, number of fruits and yield of chilli in improved and local practices at farmer's fields.

Season	No. of trails	Wilt incidence (%)		Reduction per cent	Population of sucking insect pest per plant		Reduction per cent	No. of fruit per plant		Yield (Kg/ha)		Increase in yield
		Demo	FP		Demo	FP		Demo	FP	Demo	FP	
2013-14	10	3.2	11.4	79.9	11	18	38.8	244	222	115	89	29.2
2014-15	10	2.8	12.5	77.6	7	12	41.6	232	209	101	86	16.9
2015-16	10	4.6	16.0	75.0	8	17	52.9	258	218	133	103	28.9
Average		**3.53**	**13.3**	**73.4**	**8.6**	**15.6**	**44.8**	**244**	**216**	**116**	**92**	**26.0**

Table 2 : Economics of chilli cultivation in improved technology and farmers practice.

Year	Cost of cultivation		Additional in cost of cultivation	Gross returns		Net returns		Additional net returns	B : C ratio	
	Demo	FP		Demo	Local FP	IT	FP		IT	FP
2013-14	41000	37000	4000	172500	133500	131500	96500	35000	4.20	3.60
2014-15	43350	41000	4350	182160	155700	136810	114700	22110	4.01	3.79
2015-16	56500	52000	4500	267000	207000	210500	155000	55500	4.72	3.98
Average	47615	43330	4285	207220	165400	159600	122070	37535	4.31	3.79

installation of yellow sticky trap, blue sticky trap, pheroman trap and spray of tricontanol in the experimental years. Cultivation of chilli under improved production technologies gave higher net return as Rs. 159600 per ha as compared to farmer's practices (Rs. 122070/ha). The application of improved technologies also gave higher benefit cost ratio 4.31 as compared to 3.79 under farmers practice in the corresponding years. Similar results were also reported by Hiremath and Nagaraju (2009).

The results from the on farm trails clearly brought out the potential of improved production technologies for chilli cultivation in Madhya Pradesh. Farmers convinced with the technology and adopted the mechanical method of insect control, spray of tricontanol and balance fertilizer application. Therefore, participatory programme of technology demonstrations could convince the farmers to use IPM technology on account of its obvious advantages and minimize farmer's problem, improve decision-making and innovativeness to modify their farming practices.

References

Anonymmous (2015). *State of Indian Agriculture 2015-16*. Government of India, Ministry of Agriculture & Farmers Welfare Department of Agriculture, Cooperation & Farmers Welfare. Directorate of Economics & Statistics, New Delhi.

Chaudhry, B. R., M. D. Sharma, S. M. Shakya and D. M. Gautam (2006). Effect of plant growth regulators on growth, yield and quality of chilli (*Capsicum annuum* L.)at Rampur, Chitwan. *J. Inst. Agric. Anim. Science*, **27** : 65-68.

Hiremath, S. M. and M. V. Nagaraju (2009). Evaluation of front line demonstration trials on onion in Haveri district of Karnataka. *Karnataka Journal of Agriculture Science*, **22(5)** : 1092-1093.

Pandey, S. K., A. C. Mathur and Manisha Srivastava (2010). Management of Leaf Curl Disease of Chilli (*Capsicum annuum* L.). *International J. Virology*, **6** : 246-250.

Raj, B. T. and S. B. S. Parihar (2003). Efficacy of pesticides in the management of pestcomplex of early potato in western gangetic plains. *Ann. Pl. Protec. Sci*., **11** : 148-149.

Roa, N. V., A. S. Reddy and K. T. Rao (1991). Monitoring of cotton whitefly *Bemisia tabaci* Genn. with sticky traps. *Madras Agricultural Journal*, **28** : 1–4.

Singh, D. (2007). Role of fungicides and biocontrol agents in the management of *Fusarium* wilt of chilli. *J. Mycol. Pl. Pathol*., **37** : 361-62.

Subhani, P. M., C. Ravishankar and N. Narayan (1990). Effect of graded levels and time of application of N and K_2O on flowering, fruiting and yield of irrigated chili. *Indian Cocoa, Arecanut and Spices Journal*, **14** : 70-73.