J Krishi Vigyan 2017, 6(1) : 68-70 DOI : 10.5958/2349-4433.2017.00053.8

Effect of Integrated Pest Management Practices in Brinjal (*Solanum melongena* L)

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ABSTRACT

For the management of insect pests and diseases of brinjal, farmers are using conventional as well as novel pesticides including carbendazim, cypermethrin 25 EC, spinosad 2.5 percent SC and indoxacarb 15.8 SC. The large scale use of pesticides has caused many environmental problems like pesticide poisoning, insecticide resistance, resurgence of insect pests, effect of non-target organisms and pesticide residue which led to the scientist on alternative methods of pest control in brinjal. The objectives of the study were to minimize the use of chemical pesticides and establish the use of eco-friendly management practices. For this front line demonstrations were organized during 2011-12 and 2012-13 to evaluate the feasibility and economic viability of recommended practices for the management of pests (insects and diseases) of brinjal under real farm condition. On the basis of result obtained from assessment of recommended technology, frontline demonstrations were organized to disseminate the recommended practices. Components of IPM technology used were Seedling root treatment for 3 hour with imidacloprid (1ml/litre) + Soil application of Trichoderma + installation of pheromone traps @ 35/ha + Mechanical removal of infected shoots and fruits + Spraying of NSKE 4 per cent. The recommended technology was found to offer an alternative to pesticides and was feasible, economically viable, environmentally safe and effective for pest management in brinjal.

Key words: Assessment, Impact, Brinjal, Management practices, shoot & fruit borer.

INTRODUCTION

Brinjal or egg plant (*Solanum melongena* L.) is one of the most commonly grown vegetable crop of the country. India produces about 7.8 M mt of brinjal from an area of 0.47 M ha. with an average productivity of 16.3 mt/ha. Brinjal has ayurvedic medicinal properties and white brinjal is good for diabetic patients. It is also a source of vitamins A, C and minerals. Brinjal is commonly suffered by more than a dozen insect-pest species out of which brinjal shoot and fruit borer (Leucinodes orbonalis Guenee, Pyralidae: Lepidoptera) is most serious (Sardana *et al*, 2004). In the earlier stages it attacks the terminal shoots and bores inside. Later, it also bores into the young fruits as soon as fruits start setting. *Fusarium oxysporum* f. sp. melongenae, a soil inhabiting fungus responsible for Fusarium wilt of egg plant is very common in the egg plant growing areas and can cause severe yield loss. Egg plant is susceptible to several other diseases particularly Verticillium wilt and Bacterial wilt (Sihachakr *et al*, 1994; Chakraborty, 2005). To manage this, generally farmers use huge amount of pesticides indiscriminately without any proper diagnosis which results into development of resistance and resurgence of the pests as well as environmental pollution.

MATERIALS AND METHOD

Assessment and impact of Integrated Pest Management practices in brinjal (Kashi Sandesh) were carried out through on farm trials and

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Table1. Assessment of management practices in brinjal pest (2011-12).

Treatment	Yield q/ha	% yield increase over FP	Shoot Infestation %	Fruit Infestation %	% wilt affected plant	Cost of cultivation Rs./ha	Gross Return Rs./ha	Net Return Rs/ha	B:C Ratio
Recommended Practice	208	51.8	4.3	8.2	3.7	70132	312000	241868	4.5
Farmers Practices Regular sprayof carbendazim, cypermethrin 25 EC, spinosad 2.5 percent SC and indoxacarb 15.8 SC.	137	---	18.1	29.5	36.3	73954	178100	104146	2.4

frontline demonstration at village Majhauli of Jaunpur district during 2011-12 and 2012-2013 by Krishi Vigyan Kendra, Jaunpur. For conducting the on farm trials, five innovative and receptive farmers were selected and area under each trial was 0.15ha. The applicable management practices were Seedling root treatment for 3 hr with imidacloprid (1ml/litre) + Soil application of *Trichoderma* @ 1.25 kg/ha + installation of pheromone traps @ 35/ ha. starting from 20-25 d of transplanting till final harvest and changing the lures at monthly intervals + Mechanical removal of infected shoots and fruits + Spraying of neem seed kernel extract (NSKE) 4 per cent at 15 d interval after 30 d of transplanting. The existing farmer practices include regular spray of carbendazim, cypermethrin 25 EC, spinosad 2.5 SC and indoxacarb 15.8 SC. Similarly, 6 farmers of the same village were selected for frontline demonstrations (each on 0.25ha land) during 2012-2013. A training to the farmers was imparted with respect to envisaged technological intervention. Plot-wise data was recorded from recommended practice and farmer's plots. The percentage of infected shoot and fruit was calculated on the basis of total number of healthy shoots and fruits and infested ones. Percentage of disease incidence was also calculated on the same basis. Information of yield and cost of cultivation was also recorded for economic evaluation in terms of net profit earned and the benefit cost ratio.

RESULTS AND DISCUSSION

The Average yield performance and economics of five 'on farm trials' of recommended technology and farmers' practice were assessed (Table1). The recommended practice i.e. Seedling root treatment for 3 hr with imidacloprid (1ml/litre) + Soil application of Trichoderma + Installation of pheromone traps + Mechanical removal of infected shoots and fruits + Spraying of NSKE 4% was evaluated and assessed over farmers' practice (regular spray of chemical insecticides

Table 2. Impact of frontline demonstration on yield and economics of brinjal (2012-13).

Treatment	Yield q/ha	% yield increase over FP	Shoot Infestation (%)	Fruit Infestation (%)	% wilt affected plant	Cost of cultivation Rs./ha	Gross Return Rs./ha	Net Return Rs/ha	B:C Ratio
Recommended Practice	203	50.4	4.1	7.6	3.5	68986	304500	235514	4.4
Farmer's Practices	135	----	17.7	29.1	37.1	70530	175500	104970	2.5

i.e Cypermethrin 25 EC, spinosad 2.5 percent SC and indoxacarb 15.8 SC).The yield performance of recommended practice was 208 q/ha which was 51.8 per cent higher to farmer's practice (137 q/ha). The per cent infestation of shoot and fruit by L. orbonalis and wilt disease was found 4.3, 8.2 and 3.7 in case of recommended practice while it was 18.1, 29.5 and 36.3 in farmers' practice.

Evaluation of economics clearly revealed that the net returns from the recommended practice were substantially higher than farmers practice. Net returns from recommended practice were observed to be Rs 2,41,868/-ha in comparison to farmers' practice (Rs 1,04,146/-ha), hence an increase in income of Rs 1,37,722/-ha was obtained. These benefits can be attributed to the technological intervention provided in on farm trials. The cost benefit ratio of recommended practice was also higher (4.5) than farmers practice (2.4).Thus, favorable cost-benefit ratio and higher net returns proved the economic viability of the assessed technology and convinced the farmers on the utility of technology provided at real farming situation. Similar findings were reported by Mishra *et al* (2007 and 2012) in onion and cauliflower. Outcome of the 'on farm trials' organized clearly brings out that the dissemination of assessed technology is feasible, economically viable and environmentally safe for containing shoot & fruit borer in brinjal. The assessment could convince on account of its obvious advantages and effective management of shoot & fruit borer in brinjal. These innovative practices showed solving the farmers' problem, decision-making and ability to modify their farming practices. On the basis of out come from OFT, assessment of management practices, 6 Front Line Demonstrations (FLD) were organized and their yield performance and economics of recommended technology and farmers practice were analyzed and presented in Table2. The yield performance of recommended practice was 203 q/ha which is 50.4 per cent higher to farmer practice (135 q/ha). The percent infestation of shoot & fruit by L. orbonalis and wilt disease was found 4.1 & 7.6 and 3.5 in case of recommended practice while it was 17.7 & 29.1 and 37.1 in farmers' practice. Evaluation of economics clearly revealed that the net returns from the recommended practice were substantially higher than farmers practice. Net returns from recommended practice were observed to be Rs 2,35,514/-ha in comparison to farmers practice (Rs 1,04,970/-ha), hence an increase in income of Rs 1,30,544/-ha was obtained. These benefits can be attributed to the technological intervention provided in front line demonstrations. The cost benefit ratio of recommended practice was also higher (4.4) than farmers practice (2.5).Thus, favorable cost benefit ratio and higher net returns proved the economic viability of the recommended technology and convinced the farmers on the utility of technology provided at real farming situation.

CONCLUSION

The IPM based practices were found effective in comparison to conventional methods, so, the above said management practices must be followed by the brinjal growers.

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Received on 10/01/2017 Accepted on 10/06/2017