Performance of frontline demonstrations on integrated pest management in chilli

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ABSTRACT

Chilli (*Capsicum annum* L) is an important vegetable crop cultivated in Tirunelveli district of Tamil Nadu. ICAR-Krishi Vigyan Kendra, Tirunelveli, Tamil Nadu conducted frontline demonstrations on the integrated pest management technology in chilli at Thuvarangadu village of Keezhapavoor block during rabi season of 2018-19. The IPM strategies viz dipping of seedlings in imidacloprid 70 WS @ 2 g/l of water, border crop with *Sesbania grandiflora*, spraying of neem oil @ 1 per cent, installation of yellow sticky traps @ 12/ha, installation of pheromone traps @ 12/ha, spraying of HaNPV @ 200 LE/ha, spraying of fenazaquin 10 EC @ 2 ml/l and need-based application of fipronil 5 per cent SL @ 1.5 ml/l were applied. The results revealed that adoption of IPM practices recorded the lower incidence of thrips (10.5%) and fruit borer (5.3%) as compared to the farmers' practices. Similarly the natural enemies population (4-6/plant) was also recorded higher in IPM practices fields compared to the famers' practices (1-2/plant). IPM demonstration plots recorded higher yield (11.5 tonnes/ha), net return (Rs 1,03,180) and benefit-cost ratio (2.51).

Keywords: IPM; chilli; thrips; fruit borer; natural enemies; yield; B-C ratio

INTRODUCTION

Chilli (*Capsicum annum* L) is one of the most important vegetables as well as spice crops that belongs to family Solanaceae. Basically chilli is a crop of tropical and subtropical region. It is a self-pollinated crop bearing a pod like fruit (berry) and has a predominant position among the spices grown all over India. India produces about 1.298 MT of chillies from an area of 0.806 Mha with an average productivity of 1,611 kg/ha. The pest spectrum of chilli crop is complex with more than 293 insects and mite species debilitating the crop in the field as well as in storage (Anon 1987). Among these aphids, *Myzus persicae* Suler and *Aphis gossypii* Glover, thrips, *Scirtothrips dorsalis* Hood, yellow mite, *Polyphagotarsonemus latus* Banks and the fruit borer, *Helicoverpa armigera* Hubner are the most important. Chilli thrips and yellow mite are considered the most devastating pests. Reddy and Puttaswamy (1983) recorded a total of 39 and 57 insect pests in chilli nursery and in main field respectively. Mallapur et al (2003) reported crop loss by three major pests ie 30-50 per cent by thrips (*S dorsalis*), 30-70 per cent by mites (*P latus*) and 30-40 per cent by fruit borers *H armigera* and *Spodoptera* litura. During the last two decades insecticidal control of chilli pests in general and especially in irrigated crop is characterized by high pesticide usage. Overuse of pesticides often leads to the development of undesirable problems like destruction of natural enemies, pest resurgence and failure of control strategies results in outbreak of leaf curl in chilli in addition to the presence of pesticide residues in chillies (Joia et al 2001). The farmers use huge amount of pesticides without proper diagnosis that results in pest resurgence, phytotoxicity, infertility/low fruit setting due to killing of pollinators and presence of high amount of pesticidal residue on harvested fruits. Keeping this view in mind ICAR- Krishi Vigyan Kendra planned to demonstrate the integrated pest management technologies in chilli at farmers' fields.

MATERIAL and METHODS

Integrated pest management (IPM) was demonstrated in 10 green chilli farmers' fields through frontline demonstrations (FLDs) in Thuvarangadu

village of Keezhapavur block in Tirunelveli district, Tamil Nadu during 2018-19. Each farmer raised VNR hybrid in an area of 0.4 ha. The IPM strategies viz dipping of seedlings in imidacloprid 70 WS @ 2 g/l of water, border crop with *Sesbania grandiflora*, spraying of neem oil @ 1 per cent, installation of yellow sticky traps @ 12/ha, installation of pheromone traps @ 12/ha, spraying of HaNPV @ 200 LE/ha, spraying of fenazaquin 10 EC @ 2 ml/l and need-based application of fipronil 5 per cent SL @ 1.5 ml/l were applied. The selected progressive farmers were trained on all scientific chilli cultivation aspects before starting of FLDs. The observations on thrips incidence, fruit borer damage, natural enemies population, yield per ha, net income and B-C ratio were recorded. The demonstrated fields were regularly monitored and periodically observed by the scientists of the KVK. The number of thrips was counted from each leaf by using 10x lens. The population of natural enemies included coccinellid beetles, chrysopids and spiders. They were recorded by visual observation on five randomly selected plants in each treatment. Later the observations on number of natural enemies per plant were recorded. At the time of each harvest yield data were collected from both the demonstrations as well as farmers' practices.

$$\text{Fruit damage (\%)} = \frac{\text{Number of infested fruits/plant}}{\text{Total number of fruits/plant}} \times 100$$

RESULTS and DISCUSSION

The results of pest damage and presence of natural enemies are presented in Table 1. The lower thrips incidence (10.5%) was recorded in demonstration plots compared to farmers' practices. The lower fruit borer damage (5.3%) was recorded in demonstration plots. Similarly higher population of natural enemies (4-6/hill) was recorded in IPM plots. The farmers' practices recorded a higher thrips incidence (27.8%), fruit borer damage (13.5%) and lower population of natural enemies (1-2/hill). The above findings are similar to those of Sunanda and Dethe (1998) who reported that seed dressing with 15 g of imidacloprid 70 WS per kg of seed followed by a root dip of seedlings with 0.03 per cent imidacloprid 200 SL gave excellent control of sucking pests especially thrips and mites and also resulted in highest chilli yield. The seed treatment with imidacloprid 70 WS also had phytotonic effect on seedlings in nursery by showing maximum growth and higher total chlorophyll content of leaves. Smitha and Giraddi (2006) reported that by surrounding chilli with maize, intercropping of marigold, application of neem cake @ 500 kg/ha and neem-based formulations and *Lecanicillium lecanii* enhanced the population of *Menochilus* spp, predatory green lace wing, *Chrysoperla carnea* and coccinellids resulting in reduced incidence of chilli thrips, mites and fruit damage as these biological pesticides are safer to natural enemies. It may be attributed that barrier crops

Table 1. Thrips incidence and fruit borer damage

Treatment	Thrips incidence (%)	Fruit borer damage (%)	Natural enemies (number/hill)
Demonstration field	10.5	5.3	4-6
Farmers practice field	27.8	13.5	1-2

Table 2. Yield and economics of IPM practices in chilli

Component	Demonstration field	Farmers' practice field
Yield (tonnes/ha)	11.5	9.3
Increase in yield (%)	19.13	-
Gross cost (Rs/ha)	68,350	74,615
Gross return (Rs/ha)	1,71,530	1,48,320
Net return (Rs/ha)	1,03,180	73,705
B-C ratio	2.51	1.99

prevented migration of thrips and mites and marigold acted as trap crop for fruit borer.

The yield data presented in Table 2 reveal that the adoption of IPM practices recorded the higher fruit yield of 11.5 tonnes/ha compared to 9.3 tonnes/ha in framers' practices with a yield advantage of 19.13 per cent over the farmers' practices. Highest net return and B-C ratio of Rs 1,03,180/ha and 2.51 respectively were recorded in IPM practices. The lower net return and B-C ratio of Rs 73,705/ha and 1.99 respectively were recorded in farmers' practices. The results are similar to the findings of Rajamanickam (2020) who reported that TNAU CO (Ch) 1 hybrid recorded the higher fruit yield (16.76 tonnes/ha), highest net return of Rs 1,34,920/ha and B-C ratio of 3.03 whereas farmers' practice recorded the lower net return of Rs 83,200/ha and B-C ratio of 2.19. Kurbett et al (2018) reported that IPM practices recorded a net return of Rs 93,908 and B-C ratio of 2.91. Latha and Hunumanthraya (2018) reported that IPM practices recorded a higher fruit yield (11.87 tonnes/ha), net return (Rs 1,47,519/ha) and B-C ratio (2.72).

CONCLUSION

The results of the present study indicate that adoption of integrated pest management practices drastically reduced the pest population in chilli fields and considerably increased the presence of natural enemies in the chilli ecosystem. The farmers were satisfied that the IPM technologies in chilli increased the yield and reduced the requirement of chemical pesticides with better control of pests.

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