management method for getting higher yield and economic return in irrigated onion.

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Madras Agric. J., 94 (1-6) : 130-133 January-June 2007

https://doi.org/10.29321/MAJ.10.100649

Research Notes

Evaluation of BIPM Module on tomato fruit borer *(Helicoverpa armigera)* larval population

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Tomato fruit borer, *Helicoverpa armigera* Hub. is a polyphagous pest which unto 60 per cent yield loss in tomato (Manjunath *et al.,* 1985). Synthetic insecticides are often used to suppress *H. armigera* population, because of their wide availability and potential for quick intervention. Even though insecticides are effective the demerits like resistance, residue, pest resurgence, non-target effect and environmental pollution restrict their use. As an alternative to insecticides, bioagents are ecofriendly and thus reduce the above mentioned problems. Isolated effects have been made to check *H. armigera* infestation by using one of the organic farming methods like biocontrol agents. Organic farming produces healthy plants that are better able to resist insect predation. Organic farmer's primary strategy in controlling pest is prevention through good plant nutrition and management. Biocontrol agents are very important component of organic farming. The important bioagents are: the egg parasitoid, *Trichogramma sp.* (Mani and Krishnamoorthy, 1983; Divakar, Pawar, 1987 and Kakar *et al.*, 1990), predator, *Rhynochorus* (Ambrose and Claver, 1999a), pathogens Bt (Krishna *et al.*, 12981) and HaNPV (Natarajan *et al.,* 1991). Even though *T. chilonis* is highly effective

Table 1. Effect of biointensive pest management module against *Helicoverpa armigera* on tomato

Treatments	No. of larvae / 5 plants*					
	Pre treatment count	Days after sowing				
		65	72	79	86	91
Trichogramma pretiosum @ 50,000 adults ha^{-1} + Two sprays of HaNPV @ $1.5x10^{12}$ POBs ha^{-1} + Bt 1 kg ha^{-1} + *Rhynochoris marginatus* @ 5,000 ha^{-1}.	20.33 (4.55)	10.33a (3.28)	9.50a (312)	6.50a (14.70)	4.00a (2.120	3.00a (1.86)
Insecticide (Endosulfan 35EC)	22.00 (4.74)	13.50b (13.74)	12.17b (3.56)	10.33b (18.73)	5.67b (2.48)	10.50b (3.31)
Farmers' practice	22.33 (4.78)	16.00c (4.06)	15.33c (3.98)	14.17c (27.08)	12.33c (3.57)	15.33c (3.98)
Untreated check	21.50 (4.69)	21.50d (4.69)	19.83d (4.51)	21.17d (27.38)	20.83d (4.62)	15.17c (3.95)
	NS					

* Data are means of six replicated values.

* Figures in parentheses are transformed values - x = 0.5 transformation

@ Means followed by common alphabets in a column are not significantly different (DMRT, p=0.05)

** Wherever *T.pretiosum* is mentioned, five releases were made.

against *H. armigera* in cotton, but not in tomato. But *T. pretiosum* is highly effective against *H. armigera* in tomato. To evallute the potential of *T. pretiosum* incombination with other biocontrol agents this study was carried out.

Field experiments were laid out at Thondamuthur, Coimbatore during 2002-03 to evalute *T. pretiosum* alone and in combination with other biocontrol agents against tomato fruit borer, *H. armigera.* The tomato hybrid used in the present study was COTH-1. All the management practices were followed as per the Tamil Nadu Agricultural University recommendations. The various treatments of BIPM comprised five releases of *T. pretiosum* @ 50,000 adults ha^{-1} from flower inition period + Two sprays of Ha NPV @ $1.5x10^{12}$ POBs ha^{-1} + Three sprays of B @ 1.0 kg ha-1 + Three sprays of *Bt* @ 1.0 kg ha^{-1} + *R. marginafus* @ 5,000 adults ha^{-1} (T_1); Insecticide only (Endosulfan 35EC @ 0.07%) (T_2); Farmers' practice (Insecticides used by the Farmers (monocrotophos, carbofuran, endosulfan and carbaryl) were applied as per their method without considering ETL level (T_3); Untreated check (T_4). The each treatment was replicated six times. The observations were recorded in five plants from each plot and reported before and after imposing the treatments at weekly intervals. The treatments were imposed when the larval population crossed the ETL. The different observations recorded were number of larvae before and after treatment, larval mortality and natural enemies. The data were subjected to analysis of variance and means were separated by Duncans Multiple Range Test.

Among the treatments highest larval population was recorded in farmers' practice plots (16.00) compared to BIPM plot (10.33) (Table 1) Reduction in larval population was recorded (10.33 to 3.00) 91 Days After Transplanting in BIPM plot. Similar trend was followed in all other treatments. On last application, larval population increased in both farmers' practice and insecticide applied plots, which were higher than BIPM plots. In this study BIPM was found to be superior in reducing the larval population than the insecticides and farmers' practice. For example, integration of Ha NPV *+Bt* and endosulfan reduced the *H. armigera* larval polulation on chickpea (Vikram Singh, 2000). Both egg and larval population of *H. armigera* were lower in BIPM plot of tomato (Jadav *et al.,* 1999; Mahalingam, 1996). Both insectide and farmer's plot recorded higher larval population compared to BIPM plot. Similarly BIPM plot gave higher yield than anyone of them applied alone. But in this study the predators *R. marginatus* in the BIPM plot had been included.

In summary, the studies on evaluation of *Trichogramma pretiosum* combination with other biocontrol agents against tomato fruit borer revealed that the combined application of five releases of *T. pretiosum* @ 50,000 adults ha^{-1} from flower initiation period + Two sprays of HaNPV @ $1.5x\ 10^{12}$ POBs ha^{-1}, three sprays of Bt @ 1.0 kg ha^{-1}, + *R. marginafus* @ 5,000 adults ha^{-1} were the best interm of BIPM.

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Madras Agric. J., 94 (1-6) : 133-135 January-June 2007

Research Notes

Survey and monitoring the incidence of pests of castor

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Castor, *Ricinus communis* Linn, is an important non-edible oilseed crop, widely grown under rainfed conditions. In Tamil Nadu, the castor hybrid, TMVCH 1 and TMV 6 are widely grown as pure crop during *kharif* in districts *viz.,* Salem, Erode, Namakkal and Dharmapuri due to their high seed and oil yield and heavy demand for castor oil in many industries. Castor crop cultivation has attained a momentum to become as a cash crop and intensive cultivation with hybrid castor TMVCH 1 has picked up under irrigated and rainfed conditions in Tamil Nadu. Castor cultivation is constrained by more than 60 insect pests through out the crop period (Rai, 1976) resulted in heavy yield loss. Among them the castor