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Management of Brinjal Shoot and Fruit Borer, *Leucinodes orbonalis* (Guen.) (Lepidoptera: Pyralidae) with Special Reference to IPM

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A B S T R A C T

Field experiment was conducted as a part of on farm trial in four different villages of Tinsukia district under Krishi Vigyan Kendra, Tinsukia during 2013-2017 to manage brinjal shoot and fruit borer (*Leucinodes orbonalis*) through IPM. From the experiment, it was observed that integration of different control measures proved to be the best in reducing the pest attack. The lowest per cent shoot and fruit borer infestation was observed in the IPM trial as compare to farmers practice. In all the four villages of the district, the maximum yield with higher BC ratio was observed in IPM treated plots in compare to chemical treated plot.

Introduction

Brinjal or eggplant (*Solanum melengena* L) is one of the most common and popular vegetable crops grown in Assam and other parts of India and the World. The brinjal crop is attacked by about 142 species of insects, 4 species of mites and 3 species of nematodes in different countries of the World (Sohi, 1966). Amongst these pests, brinjal shoot and fruit borer is the most serious and destructive one (Butani and Jotwani, 1984; Nair, 1986; Chattopadhyay, 1987). Although no information exists on the pest in terms of origin and diversity, it was concluded that brinjal shoot and fruit borer is also native to India due to its monophagous nature.

The incidence of the pest is sporadic and outbreaks every year throughout the country as well as in the Indian sub-continent (Dhankar, 1988). The intensity of infestation may go over 90% in case of heavy infestation (Ali *et al.*, 1980; Kalloo, 1988) and yield loss in certain cases may go up to 63% (Dhankar *et al.*, 1977) for which farmers mainly use

chemical pesticides. Being an internal borer, it requires application of systemic insecticides, which may leave residue in the fruits making the produce unsuitable for consumption. In order to overcome this problem as well as other associated problems, it is necessary to adopt IPM strategies for the management of this insect.

The IPM of brinjal shoot and fruit borer involves different eco friendly methods like removal and destruction of shoots and fruits with larvae, use of resistant varieties, application of plant extracts such as neem extracts, use of microbials like *Bacillus thuringiensis* var. *krustaki*, release of egg parasitoids *Trichogramma japonicum*, judicious application of chemical pesticides etc. Several IPM trials have been conducted all over the World and found that integration of all these control measures along with the application of pesticides reduces the pest problem to a great extent (Islam *et al.*,, 1999; Patnaik and Singh, 1997). The incorporation of biopesticides and IPM technology is also gaining importance in recent years (Prabhat, and Johnsen, 2000; Bajpai *et al.*,, 2005)

Tinsukia district produces a huge quantity of vegetables in different pockets. Farmers are producing vegetables in varieties like brinjal, tomato, cabbage, cauliflower, knolkhol etc. During a survey conducted by KVK scientist, it was observed that fruit and shoot borer problem was serious in brinjal growing areas of the district which reduces the yield considerably. Hence, farmers are tended to discontinue the cultivation of brinjal. Thus an attempt has been made to evaluate the affect of Integrated Pest Management (IPM) for the control of *L. orbonalis*

Materials and Methods

The study on IPM of brinjal shoot and fruit borer was conducted in 4 different villages viz., Kherbari, Nabarmura, Langkashi and Tingrai of Tinsukia district of Assam during 2013- 2017 as part of On farm trial. There were 2 treatments consisting of IPM trial and farmers practice. The details of the experiment were as follows-

T_1: IPM Module

Release of *Trichogramma chilonis* @ 50,000/ha (6 times at weekly interval)

Wood ash @ 200 kg/ha

Clipping of infested shoots

Destruction of infested fruits

Need based insecticide application (Deltamethrin @ 0.005%)

T_2: Farmer's practice (Chemical Control)

Crop: Brinjal
Variety: Pusa Purple Long
Sowing time: Sept-Oct.
Spacing: 75 x 60 cm
Seed rate: 700-800 gm/ha

The variety Pusa Purple Long of brinjal was grown in the villages applying all the recommended package of practices. The shoot and fruit infestation was recorded at 30 days intervals till harvest.

In each plot, 1 square meter area was chosen arbitrarily and each plant was examined and the number of plants showing symptoms of shoot and fruit infestation was recorded. Per cent shoot and fruit infestation was calculated using the following formula.

$$\text{Per cent shoot and Fruit infestation (\%)} = \frac{\text{Nos. of shoot/ fruit infested}}{\text{Nos. of shoot/fruit examined}} \times 100$$

The benefit cost ratio was calculated on the basis of prevailing market prices of brinjal and other inputs. Benefit cost ratio was calculated as follows:

$$BCR = \frac{\text{Gross return}}{\text{Total cost}}$$

Results and Discussion

From the experiment, it was observed that integration of different control measures proved to be the best in reducing the pest attack. The lowest per cent shoot and fruit borer infestation was observed in the IPM trial as compare to farmer's practice where only chemical treatment was given. In all the trial area of the district, the highest yield was observed in IPM trial in compare to chemical treated plot. The highest yield of 286 q/ha was recorded in the IPM trial in Kherbari area in the year 2013-14 and lowest of 258 q/ha in Tingrai area in the year 2016-17. Similarly, highest BC ratio was observed in all the IPM treated plots of the district and lowest in farmers practice. Likewise per cent increase in yield over farmers practice was recorded from 18 to 30 % which is quite satisfactory.

ITK Observed

A number of ITKs were generally followed by brinjal growers amongst which application of wood ash to control the infestation of brinjal shoot and fruit borer is common. This practice, however, helps in reduction of attack by soft bodied insects. Ash acts as the physical poison and contributes towards enriching the soil with potash. Potash on the other hand, build up the resistance in the plant. Summer deep ploughing of the field is expected to reduce the borer population by killing the residual population of the borer residing inside the stubbles. Time of planting is also crucial, early planting helps the crop to escape the attack of the borers. Therefore, early planting is advocated in Assam.

Table.1 Yield, per cent infestation and BC ratio for different treatments in four locations against brinjal shoot and fruit borer during 2013 -2017

Year	Location	Treatments	% leaf infestation	% fruit infestation	Yield (q/ha)	% increase in yield	BC ratio
2013-14	Kherbari	IPM practice	19.3	15.4	286	30.0	6.23
		Farmers practice	26.8	21.0	220		5.47
2014-15	Nabarmura	IPM practice	20.4	14.4	282	34.28	5.87
		Farmers practice	27.6	20.8	210		4.63
2015-16	Langkashi	IPM practice	16.4	14.4	265	16.22	5.77
		Farmers practice	22.4	20.4	228		4.79
2016-17	Tingrai	IPM practice	18.6	15.4	258	18.3	6.61
		Farmers practice	25.8	20.8	218		5.6

It can be concluded that IPM strategy is always better than chemical application to manage pest and disease properly. A farmer's choice of which crops to plant and thus the ability to select disease and pest resistance ones has always been a cornerstone of IPM. The adoption of IPM application is still low owing to a number of socio-economic, institutional and policy constraints. IPM strategy comes as a direct tool that includes several old and new techniques with alternatives like botanicals, parasitoids and

resistant cultivars to cut down on pest infestation. The current scenario of IPM in brinjal can have a great scope for getting higher yield of the crop with low pest and disease infestation. There is a need for massive extension training and demonstration trial for motivating the farmers of the district to adopt IPM strategies.

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