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Effect of insecticides in management of brinjal shoot and fruit borer (*Leucinodes orbonalis* Guene)

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Three insecticides i.e. Endosulfan (0.05%), Cypermethrin (0.05%) and Malathion (0.05%) were sprayed against the infestation of shoot and fruit borer to evaluate suitable control measure against the pest to get the higher yield. The minimum (21.5%) infestation was observed with Endosulfan followed by Cypermethrin (24.13%) and Malathion (25.17%). Total yield of healthy brinjal fruits was higher (350q/h) with Endosulfan treated plants and lowest (112.5q/h) with control. High profit was obtained from Endosulfan (0.07%) applied schedule followed by Cypermethrin (0.05%) for each rupee.

Key words : Insecticides, Endosulfane, Cypermethrin,Malathion,Brinjal

INTRODUCTION

Brinjal (*Solanum melongena* L.) is very much palatable among widely grown vegetables in different parts of the world. Among the Solanaceous vegetables, brinjal, *Solanum melongena* Linn. is the most common, popular and principal vegetable crop grown in many geographical parts in India. The area under brinjal cultivation is estimated at 0.51 million ha. with total production of 8,200,000 Mt (FAO data, 2005, http://faostat.fao.org/). There is a vast scope to make brinjal cultivation more paying by improving the productivity. Brinjal shoot and fruit borer (*Leucinodes orbonalis* GUENE) causes serious damage to brinjal crop in all the regions of the country with losses range from 50-70%. The young larvae of the pest bore in to petioles and midribs of large leaves and tender shoots causing shoot tips to wilt and later they bore in to flower buds and fruits. The larvae of the pest move about for sometimes often hatching and bore in about 30 minutes in the fruits through epicarp (Panda *et al*., 1971). The affected fruits loose their market value besides considerable reduction in yield. The pest poses a serious problem because of its high reproductive potential, rapid turnover of generations and intensive cultivation of brinjal both in wet and dry seasons of the year. Farmers use large quantities of chemical insecticides singly or in combination to get blemish free fruits, which fetch premium prices in the market. Around 25 to 80 sprays are undertaken for effective control of brinjal fruit and shoot borer. Lack of resistant cultivars and effective biological control agents and other non-chemical pest control measures have led to the use of toxic chemicals for its control. Despite diverse ill effects of the chemical pesticides, insecticides use still contributing to be the means to tackle this pest. Realizing serious pest status of original shoot and fruit borer, few promising and widely recommended insecticides were incorporated in the present investigation.

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MATERIALS AND METHODS

An investigation was conducted at Agriculture farm of the Raja Balwant Singh College, Bichpuri, Agra (U.P.) during winter season. Three insecticides i.e. Endosulfan (0.05%), Cypermethrin (0.05%) and Malathion (0.05%) were sprayed against the infestation of shoot and fruit borer to evaluate suitable control measure against the pest to get the higher yield. The experiment was laid in Randomized Block Design with four replications. The observations of the effect of various treatments in different insecticidal schedules on shoot damage, fruit damage, total fruit yield and total healthy fruit yield were recorded. Fruit infestation was recorded on each plucking date at 7, 14, 21 day after each spraying. Total healthy fruits harvested from each treatment both in number and weight were also estimated. For computing the economics of application the cost of additional yield over control and cost of application of insecticides were calculated. Analysis of variance was done according to Snedecor and Cochron (1956).

Table1. Effect of insecticides in management Brinjal shoot and fruit borer

Treatments	Shoot Damage (%)	Fruit Damage (%)	Total Fruit Yield (q/h)	Total Healthy Fruit (q/h)
Endosulfan(0.05%)	8.43	21.52	406.25	350
Cypermethrin (0.05%)	11.80	24.13	358.43	285.93
Malathion (0.05%)	13.97	25.17	312.08	245.31
Control	58.72	48.90	318.75	112.50
CD (p=0.05)	9.00	5.50	5.00	18.51

Table 2: Economics of insecticidal control of brinjal shoot and fruit borer

Treatments	Expenditure of spraying (Rs)**	Additional yield of healthy fruits over control (q/ha)	Price of additional yield (Rs)*	Profit due to Spraying (Rs)	Cost benefit Ratio
Endosulfan (0.07%)	13675	237.5	109400	95725	1:7
Cypermethrin (0.05%)	11560	173.4	69360	57800	1:5
Malathion (0.05%)	13280	132.8	53120	39840	1:3

*Cost of brinjal Rs 4.00 kg^{-1} **Included cost of insecticides

RESULTS AND DISCUSSION

Endosulfan, Cypermethrin and Malathion were significantly (p=0.05) superior to control by minimizing the shoot and fruit damage and producing higher total healthy fruit (Table1). The overall mean percentage of shoot damage recorded after second spraying indicates the superiority of Endosulfan (8.43%) followed by Cypermethrin (11.8%) and Malathion (13.97%). A good reduction in percentage of shoot damage was noticed in treated plants due to efficacy of chemicals. Singh and Singh (2003) observed that cypermethrin at 25 g a.i./ha were highly effective against the pest and resulted in higher yield of healthy fruits i.e. more than 1.75 kg/m^2 compared to other treatments. Among the conventional insecticides, endosulfan, monocrotophos and fenitrothion at 0.25 kg a.i./ ha, along with carbofuran, were effective in controlling the pest and recorded yield of over 1.41 kg/m^2.

All the insecticidal treatments significantly minimise the percentage of damage fruit as compared to control. The minimum (21.5%) infestation was with Endosulfan followed by Cypermethrin (24.13%) and Malathion (25.17%). A field experiment was conducted in Himachal Pradesh by Mehta *et al*. (1998) for the control of brinjal fruit and shoot borer, Leucinodes orbonalis (Guen.), on brinjal variety Pusa purple cluster. Two sprayings of malathion (0.05%), endosulfan (0.07%), monocrotophos (0.036%), fenitrothion (0.05%), deltamethrin (0.008%) or fenvalerate (0.01%) each were done after an interval of 15 days commencing from the initiation of flowering in the crop. All insecticidal treatments gave effective control of the pest and increased the yield of fruits. The total yield was significantly higher with treated plant over control except Malathion application. As regard the total yield of healthy brinjal fruits was higher (350q/h) with Endosulfan treated plants and lowest (112.5q/h) with control. This increase in yield in Endosulfan treated plants against the control as well as other treated plants may be due to suitability of Endosulfan in controlling the infestation

of brinjal shoot and fruit borer, as the data recorded in respect of percentage infestation of shoot and fruit also indicate the superiority of this insecticide over other treatments, Mishra (1993) also reported that spraying of Endosulfan gave highest yield of healthy brinjal fruits. Irrespective of fertilizers, four sprays alternatively with endosulfan @ 0.5 kg kg a.i./ha and fenvalerate @ 0.1 kg a.i./ha recorded comparatively lower fruit damage both in quantity (21.7-37.6) and quality (20.1-35.3%) as against 25.5-46.5% infestation in untreated plots (Patnaik *et al.*, 1998).

It is evident from the cost: benefit analysis (Table 2) that for each one rupee spent on insecticide application the profit margin ranged from 1.3 to 7.0 in different treatment schedules. High profit was obtained from Endosulfan (0.07%) applied schedule followed by Cypermethrin (0.05%) for each rupee.

It can be suggested that Endosulfan (0.05%) proved to be superior over control as well as other treatments by successful management of this noxious pest of great economic importance by increasing the yield of healthy fruits and decreasing the infestation of brinjal shoot and fruit borer.

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