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Bio-efficacy of new chemicals against shoot and fruit borer of brinjal

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Abstract
Field experiment was conducted to evaluate the bio-efficacy of various new chemicals against shoot and fruit borer of brinjal during *kharif* season of 2010-11. The experiment was conducted in Randomised Block Design with eight insecticidal treatments replicated thrice. The variety, Muktakeshi was used for experimental trial. The experiment was conducted at Sabour Agricultural College farm with plot size 5.25 x 4.50 m^2. The different insecticidal treatments were Spinosad 45SC@0.5 ml/lit., Indoxacarb 14.5 SC@0.5ml/lit, Emamectin benzoate 25 WG @ 0.4 gm/lit, Rynaxypr 18.5 SC@0.3 ml/lit. Flubendamide 39.35 SC@0.3 ml/lit, Deltamethrin 5 EC@0.5ml/lit+Triazophos 35 EC@2.0ml/lit, Endosulphan 35 EC@1ml/lit and untreated control. Among the different insecticidal treatments, by application of Emamectin benzoate 25 WG@0.4gm/lit recorded lowest fruit damage of 6.95% with highest yield of 351.46 qt/ha. However, it was at par with Spinosad 45 SC@0.5 ml/lit with fruit damage of 8.06% and yield of 341.75 q/ha.

Keywords: Bio-efficacy, insecticides, *Leucinodes orbonalis*, brinjal

Introduction
A general view of the pest problem in brinjal in India reveals that this crop is attacked severely by number of pests *viz*; shoot and fruit borer (*Leucinodes orbonalis Guen*), epilachna beetle (*Epilachna vigintioctopunctata Fab.*), jassid (*Amrasca biguttula biguttula Ishida*), aphid (*Myzus persicae saunder*), thrips (*Thris tabaci Lindemann*) and white flies (*bemicia tabaci Gennadius*). Out of these pests, shoot and fruit borer, *Leucinodes orbonalis* G. is considered to be the most destructive. The infestation on brinjal can be as high as 75 to 92 per cent, Dilbagsingh and Sindhu, 1988 [1]. Infestation of this pest starts after a few weeks of transplantation. The caterpillars bore into the stems or petioles of large leaves and feed on internal tissues. As a result of damage, affected stems wither and plants exhibit symptoms of drooping. After fruit formation, they make entry under the calyx and then into the fruit. The holes later plugged with excreta leaving no visible sign of infestation. Large holes seen on the fruits are exit holes. Such fruits are rendered unfit for human consumption and fetch fewer prices in the market. Several insecticides are being used for the control of shoot and fruit borer of brinjal. Mote, 1981 [2] and Datar and Ashtaputre 1984 [3] reported 48-57 per cent losses in the yield of brinjal fruits due to *Leucindoes orbonalis.* Per cent losses in terms of brinjal fruits and fruit weight loss were also estimated by (Gangwar and Sachan, 1981; Naresh *et al.* 1989; Islam and Quiniones, 1990; Chatterjee and Roy, 2004; Bharadiya and Patel, 2005; Kumar and Devappa, 2006) [4, 5, 6, 7, 8, 9]. It was the need of present work to develop strategy to control the shoot and fruit borer of brinjal. The objective of the paper was to test the bio-efficacy of new chemicals against shoot and fruit borer of brinjal in the present investigation.

Materials and Methods
The experiment was laid out in randomised block design with eight treatments each replicated thrice. The net plot size was 5.25 x 4.50 m^2. Row to row and plant to plant distance was 75 cm. The experiment was conducted in *kharif* season of 2010-11 at All India Co-ordinated Research Project Vegetable Farm, college of Agriculture, Bihar Agricultural University, Sabour. Agronomic practices were followed as per recommended schedule. The seedlings grown on raised beds were transplanted in the main field after one month. Transplanting was done on the flat beds with 75 x 75 cm spacing. Healthy and vigorous seedlings were preferred for transplanting. Protected irrigation was given immediately after transplanting and thereafter irrigations were given at an interval of 15 days.

Administration of treatments

T_1	Spinosad, 45 SC@0.5 ml/lit
T_2	Indoxacarb 14.5 SC@0.5ml/lit
T_3	Emamectin benzoate 25 WG @ 0.4 gm/lit
T_4	Rynaxypr 18.5 SC@0.3 ml/lit
T_5	Flubendamide 39.35 SC@0.3 ml/lit
T_6	Deltamethrin 5 EC@0.5ml/lit+Triazophos 35 EC@2.0ml/lit
T_7	Endosulphan 35 EC@1ml/lit/Cypermethrin 20 EC@0.5ml/lit
T_8	Control

Application of insecticidal treatments was initiated one month after transplanting i.e. on 02/09/2010 and continued thereafter at 10 days interval. In all, five sprays were applied during the crop season. Spraying was done in early morning hours to avoid mid-day heat. The spray volume ranged from 250-550 lit per hectare depending upon crop stage. Measured quantity of insecticide was taken in 250 ml capacity beaker and mixed in small quantity of water, and then it was added to a bucket containing known quantity of water. Spraying was done using knapsack sprayer, fitted with solid cone nozzle. Due care was taken to cover the lower side of leaves for effective control of pests.

Five plants were selected randomly in each plot. Percentage infestation due to shoot and fruit borer was recorded by observing healthy and infested fruits at each harvesting. The data on per cent infestation by shoot and fruit borer were transformed into arcsin values before statistical analysis. For proper and authentic results, proper authentic and standard method was adopted in the present experiment.

Results and Discussion

The observations on per cent infestation of shoot and fruit borer were recorded and presented in Table 1. In control of shoot and fruit borer, all the treatments were significantly superior over control. Among the different insecticidal treatments with application of Emamectin benzoate 25wg@0.4gm/lit. recorded lowest fruits damage of 6.95% with highest yield of 351.46 qt/ha. However, it was at par with Spinosad 45 SC@0.5 ml/lit with fruit damage of 8.06% and yield of 341.75 q/ha.

Table 1: Efficacy of treatments against brinjal fruit and shoot borer.

Treatments	% Damage by borer		Mean yield q/ha
	Shoot	Fruit	
T_1	4.62 (12.38)	8.06 (16.45)	341.75
T_2	5.51 (13.50)	9.78 (18.20)	329.82
T_3	4.25 (11.83)	6.95 (15.15)	351.46
T_4	7.59 (15.94)	14.28 (22.04)	281.06
T_5	6.53 (14.75)	11.60 (19.85)	289.86
T_6	7.82(16.18)	9.36 (17.68)	311.99
T_7	8.89 (17.25)	13.16 (21.18)	274.00
T_8	14.24 (22.11)	35.44 (36.50)	190.25
C.D. at 5%	2.58	3.67	58.96
C.V. (%)	9.51	10.05	11.36

The results of present investigation are in conformity with those of Anil and Sharma (2007) [10] in brinjal against *Leucinodes orbonalis*. They found that in terms of shoot infestation, emamectin benzoate (0.002%), endosulfan (0.05%), novaluron (0.01%) and lambda-cyhalothrin (0.004%) were found superior. The total number of drooping shoots was minimum (4.17) in emamectin benzoate followed by endosulfan (6.83) and novaluron (7.00) as compared to spinosad (9.17) and deltamethrin (11.67). In terms of reduction of fruit infestation, emamectin benzoate (0.002%) was highly effective followed by endosulfan (0.05%) and spinosad (0.0024%). Similar results were also obtained by Tamoghna, S.*et.al.* (2014) [11].

Conclusion

Among the different insecticidal treatments, by application of Emamectin benzoate 25 WG@0.4gm/lit recorded lowest fruit damage of 6.95% with highest yield of 351.46 qt/ha. However, it was at par with Spinosad 45 SC@0.5 ml/lit with fruit damage of 8.06% and yield of 341.75 q/ha.

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