



Effect of biological and spinosad insecticide on larvae of okra shoot and fruit borer *Earias vittella* (fab)

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Abstract: The toxicity evaluated the Spinosad on four instars larvae of okra shoot and fruit borer *Earias vittella* (fab). In the study 3rd, and 4th instars larvae were exposed to different concentration of spinosad, *Beauveria bassiana* *Trichoderma viridae* and *Bacillus thuringiensis* under laboratory condition using dipping condition. The exposure times were 24, 48, and 72 hrs for oral trails. After treatment the samples were held under constant condition in a laboratory rearing room (25 + 20c50 + 5% RH and 14 : 10 h L :D photoperiod). The maximum mortality rate for 3rd, and 4th instars larvae in 0.25%, 0.5%, 0.75 and 1% of spinosad 45Sc, *Beauveria bassiana* 2ng/mg *Trichoderma viridae* 9ng/mg and *Bacillus thuringiensis* 9ng/mg was achieved 100, 95.5 93.3. 93.3, 90.5, 88.7, and 85.6 after 72 h, respectively. In the present studies on the basis of observation in can be calculated that in the laboratory condition treatment T₄ spinosad 45 SC 1% was the best effective in comparison than other treatment viz. *Beauveria bassiana* and *Trichoderma viride* were effective in Larval mortality. T₇ Spinosad 45SC 0.25% less effective and T₀ control is not effective.

Keywords- *Earias vittella*, *Abelmoschus esculentus*, Spinosad 45Sc

Introduction

Okra (*Abelmoschus esculentus* (L. Moench) family Malvaceae, originated in Asia and Africa Also known as lady's finger or bhindi is an export-oriented crop in India as its fruits are exported to the neighboring countries like Bangladesh, Malaysia, Singapore, Mauritius, etc (Yap lai Fong *et al.*, 2011). Okra is cultivated throughout the year but summer and kharif are the favourable seasons for its cultivation. India is the largest producer of okra in the world. The major bhindi growing states are Uttar Pradesh, Orissa, Bihar, West Bengal, Andhra Pradesh, Karnataka and Assam. In India, okra is being cultivated on an area of 530 thousand hectares with production of 6350.30 million tons of fruits with a productivity of 12 tons per hectares. In Uttar Pradesh, okra is grown in an area of 13.46 thousand hectares with a production of 131.2 thousand tons of fruits with productivity 10 thousand tons per hectare (Anonymous 2013-2014). The okra plant has medicinal values and useful in many diseases of human beings (stone in kidney, leacorrhoea, backache, and goiter). Okra crop is infested by many insect pests but *Amarasca devastance*, *Earias vittella*, *Bemisia tabaci*, *Helicoverpa armigera* are the major pest of okra. *Earias vittella* (Fab.) is widely distributed and abuses 8.4 –73.2% infestation on fruit of okra depending on the season (Asha and Asha 2014). The avoidable losses in yield & fruit damage due to this pest have been estimated from 36-90% (Mishra *et al.*, 2002). The highest suppression of fruit borer infestation was with lambda-cyhalothrin, and spinosad 14.60% and 17.07% compared to untreated control with 40.41 and 36.09% during *Kharif* 20012-13. A total of 26 herbivory and 23 predatory insects species recorded in the bhindi ecosystem Ardhendu *et al.* (2014).

This present works aim to biology of okra shoot and fruit borer (*Earias vittella*) and effect of biological and Spinosad insecticide on larvae of okra shoot and fruit borer *Earias vittella* (fab) in laboratory condition.

Materials and Methods

Laboratory studies were carried out at the department of entomology, N.D.U.A. & T. Third and fourth instars larvae use for evaluating the efficacy of different concentration of spinosad, *Beauveria bassiana* *Trichoderma viridae* and *Bacillus thuringiensis* under laboratory condition against the pest.

Mass rearing of okra shoot and fruit borer (*Earias vittella* Fabricius): The larvae of *Earias vittella* collect from the okra in the central research field of University. Larvae reared in the laboratory on okra fruit for further culturing the okra fruit will provide and the larvae allowed pupating in the rearing vats and container. These pupae will transfer in adult emergence chamber by maintain equal male and female ratio (1:1) and will provided adult diet (10% honey solution). Two pairs of moth will realised in each mating chamber made of glass bell jar. The small strips of cotton cloth (nappy liners) and fresh okra fruit will use as oviposition substrate for the female moths. This substrate after egg laying will kept in glass bear for hatching. The neonates' emerging the eggs will carefully realised on small pieces of okra fruit for 3-4 days then transfer on the freshly prepared treated pieces of okra. The larvae from this "F-1" generation will used for conducting the bioassay studies (Resistant pest Management Newsletter 2003).

A leaf dip bioassay method was followed as described by using small pieces of okra fruit. Spinosad and other biopesticides were used for laboratory test. The okra fruit without the inside of the main plant from separate pots were first washed with distilled water containing 0.1% thoroughly and dried okra fruit disc of 5 ± 0.5 cm diameter were cut from cabbage leaves and dipped in solutions of different concentrations prepared with spinosad and other biopesticides. Each disc was dipped for 10 to 15 second and allowed to air dry for a period of 1 h in room temperature. Larval mortality was recorded up to 24, 72 and 120 h of treatment. Because *Earias vittella* (Fabricius)

Table-1: The data pertaining to efficacy of biological insecticides treatment against larval mortality *E. vittella* after first and second spray

Treatment	1 st spray				2 nd spray			
	24 hrs	72hrs	120 hrs	Over all	24 hrs	72hrs	120 hrs	Over all
T ₁ - <i>Beauveria bassiana</i>	63.33 (52.73)	73.33 (58.90)	96.66 (79.46)	74.44(59.63)	53.33(46.90)	76.66(61.11)	93.33(75.03)	77.77(59.63)
T ₂ - <i>Trichoderma viridae</i>	50.00 (45)	66.66 (54.73)	83.33 (65.90)	67.77(54.40)	46.66(43.08)	73.33(58.90)	83.33(65.90)	66.67(54.40)
T ₃ - <i>Bacillus thuringiensis</i> .	33.33 (35.26)	56.66 (48.82)	80.00 (63.43)	70.00(56.78)	60.00(50.76)	63.33(52.73)	86.66(68.57)	70.00(56.78)
T ₄ - Spinosad 45sc 1%	86.00 (68.02)	100.00 (90.00)	100.00 (90.00)	87.77(69.53)	73.33(58.90)	93.33(75.03)	96.66(79.46)	87.77(69.53)
T ₅ - Spinosad 45sc 0.75%	46.66 (43.08)	66.66 (54.73)	93.33 (75.03)	72.22(58.19)	33.33(35.26)	73.33(58.90)	90.00(71.56)	72.22(58.19)
T ₆ - Spinosad 45sc 0.5%	30.00 (33.21)	46.66 (43.08)	53.33 (46.90)	51.11(45.63)	30.00(33.21)	50.00(45.0)	73.33(58.90)	51.11(45.63)
T ₇ - Spinosad 45sc 0.25%	3.33 (10.51)	13.33 (21.41)	33.33 (35.26)	23.33(28.88)	0.00(0)	20.00(26.56)	50.00(45.00)	23.33(28.88)
T ₈ - control	0.00 (0)	0.00 (0)	3.33 (10.51)	1.11(6.04)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Overall Mean	29.08	52.91	68.1	53.03	37.08	37.08	56.24	71.66
	Result	S. Ed. (±)	C.D. at 5%		Result	S. Ed. (±)	C.D. at 5%	
Due to Treatments	S	0.276	0.552	0.422	S	0.368	0.737	0.416
Due to hrs	S	0.178	0.256	0.356	S	0.238	0.476	0.321

is such a sensitive insect to Spinosad, the 24, 72 and 120 hrs mortality data observed were more efficient and were strongly associated with results from longer bioassays. Liquid formulation of insecticide will be mix with okra fruit pieces. The larvae population will be recorded before insecticide application and data recorded to 1, 3 and days. Statistical analysis was done to test the level of significance and to compare the treatments using the following formula (Kumar, 2009).

Result and Discussion

The effect of biological insecticide treatments was assessed on the basis of larval mortality of shoots and fruits by shoot and fruit borer (*Earias vittella*).

Larval mortality of okra shoot and fruit borer (first spray): All the treatments were found to be significantly superior to control in reducing mortality of okra shoot and fruit borer 100% (total larvae dead) and 95.33% after 120hrs respectively. Our results Spinosad could be an important agent in control of larval instars of *Earias vittella*. These result was similar to the finding reported by (Ranjbari, S., 2012 and Wajid Hassan, 2010) The maximum mortality rate for 4th instars larvae in 800 and 900 ppm of Spinosad was achieved 95 and 100% after 72 h, respectively next effective treatments *B. bassiana* gave 96.66%, spinosad 75%. gave the similar result 93.33% were significantly *T.v.*, *B.t.* spinosad 50% and spinosad 25% gave the results 83.33, 80.00, 53.33 and 33.33% average mortality, respectively Treatments. These result was similar to the finding reported by El-Khawas and Abdul El-Gward (2002), Karthikeyan A. and Selvanarayanan V. (2011).

Mean (24hrs, 72hrs and 120hrs) after larval mortality 2nd spray: All the treatments were found to be significantly superior to control in reducing mortality of okra shoot and fruit borer (*Earias vittella*). The maximum mortality rate for 3rd and 4th instar larvae in spinosad 45 SC 900 ppm and *Beauveria bassiana* gave the results 96.33% and 94.5% after 120hrs respectively. Our results suggest Spinosad could be an important agent in control of larval instars of *Earias vittella*. These result was similar to the finding reported by (Naik et al 2012 & Malik et al. 2013) next effective treatments *B. bassiana* gave 93.33% spinosad 0.75%, *B.t.*, and *T.v.* gave the results 90.00, 86.66 and 83.33% were low significantly spinosad 0.50% and spinosad 0.25% gave the results 73.33 and 50.00% its resulted are supported (Shelkar and Regupathy 2004, & Gajmer et al (2002). In the present studies on the basis of observation in can be calculated that in the laboratory condition treatment T₄ spinosad 45 SC 1% was the best effective in

comparison than other treatment viz. *Beauveria bassiana* and *Trichoderma viride* were effective in Larval mortality.

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