Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(6): 1279-1281

Received: 11-09-2020
Accepted: 13-10-2020

**Gundavarapu Kaveri**
Department of Entomology, Naini Agricultural Institute, Sam Higgingbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

**Ashwani Kumar**
Department of Entomology, Naini Agricultural Institute, Sam Higgingbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

**Corresponding Author:**
**Ashwani Kumar**
Department of Entomology, Naini Agricultural Institute, Sam Higgingbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

# Field efficacy of certain biopesticides against okra shoot and fruit borer, *Earias vittella* (Fabricius) on okra, *Abelmoschus esculentus* (Linn.) Moench

**Gundavarapu Kaveri and Ashwani Kumar**

**Abstract**
The present investigation entitled "Field efficacy of certain insecticides against shoot borer *Earias vittella* (Fabricius) on Kharif season okra in Prayagraj (U.P.)" cultivar i.e. VRO-6 was conducted during July to November 2019 at Central Research Farm, SHUATS, Naini, Prayagraj.
Two applications of seven insecticides *viz*; Spinosad 45% SC, *Metarrhizium anisopliae*, *Verticillium lecani*, *Beauveria bassiana*, Neem oil 3%, karanjin 2% EC, Aloevera extract 1%, were evaluated against shoot and fruit borer, *Earias vittella*. Minimum percent of shoot infestation, percent fruit infestation and B:C ratio were observed in Spinosad 45% SC with (5.22%, 5.86% and 1:11.1) respectively which was followed by *Beauveria bassiana* (11.63%, 12.33% and1:8.43) <Neem oil 3% (13.86%, 14.13% and 1:7.88) <*Verticillium lecani* (16.81%, 15.51%, and 1:7.78) <*Metarrhizium anisopliae* (17.44%, 16.06% and 1:7.58) <karanjin 2% EC (19.68%, 17.45% and 1:5.46) <Aloevera extract 1% (20.35%, 18.75% and 1:5.19) < untreated control (water spray) (24.37%, 24.35% and 1:4.22) respectively.

**Keywords:** efficacy, benefit cost ratio, *Earias vittella*, biopesticides, okra shoot and fruit borer

## Introduction
Okra [*Abelmoschus esculentus* (L.) Moench] is an annual vegetable belonging to Malvaceae family; it is also known by different names *viz*., ladies finger, bhindi, bamia, okro or gumbo in different parts of the world. Okra is known as 'Queen of vegetables'. Okra is valued for its tender green fruits. It is cooked in variety of ways and used as an ingredient in a wide variety of dishes.Its medicinal value has also been reported in curing ulcer and relief from haemorrhoids (Subbireddy K.B., 2018) [7].
The total area and production under okra in the world is reported to be 1.26 million ha and 22.29 million tones, respectively. India ranks first in okra production 5784.0 thousand tones (72% of total world production) having area of 1148.0 thousand hectares with an annual production of 6346 million tones and productivity of 11.9 million tons/ha. In Uttar Pradesh area, production and productivity of okra is 12.19 ha, 148.64 tons, 12.2 metric tons per hectare. Okra contains carbohydrate, proteins and vitamin c in large quantities [Water (%) 90, Energy (kcal) 38, Protein (g) 2.0, Fat (g) 0.1, Carbohydrate (g) 7.6, Fiber (g) 0.9, Ca (mg) 81, P (mg) 63, Fe (mg) 0.8, Na (mg) 8, K (mg) 303, Vitamin A (iU) m660, Thiamine (mg) 0.20, Riboflavin (mg) 0.06, Niacin (mg) 1.00, Ascorbic acid (mg) 21.1 and Vitamin B6 (mg) 0.22] (Pachole, 2017) [2].
One of the important limiting factors in the cultivation of okra is insect pests. Many of the pests occurring on cotton are found to ravage okra crop. Nearly 72 species of insects have been recorded of which okra fruit and shoot borer *E. vittella* (F.) (Lepidoptera: Noctuidae) is a widely distributed insect pest on okra (Rawat and Sahu, 1973) [5]. Okra shoot and fruit borer *Earias vittella*, okra jassid, cut worm, white fly, aphids etc. causes significant damage to the crop. There is a reduction of 49.8 and 45.1 percent in height and number of leaves, respectively due to attack of leafhopper (Rawat and Sahu, 1973) [5]. The female moth lays up to 200-400 eggs at night singly on flower buds, bracts and tender leaves of Okra plants. Incubation period of eggs are 3-4 days and the caterpillar passes through 6 stages, becoming full grown in 10-16 days. They pupate either on plants or on ground among fallen leaves and the moth emerge in 8-14 days in summer and 18-23 days in winter. The lifecycle is completed in 17-29 days. Several overlapping generations are completed in a year. In this study we get complete knowledge of damage control of *Earias vittella* by choosen biopesticides.

## Materials and Methods

The field trial was laid out at the Central Research Field in randomized block design with eight treatments including an untreated control, each with three replications. The "VRO-6" variety of okra was used and a healthy crop was raised by following all the recommended agronomical practices. The plot size was 2m x 2m and the spacing between rows and plants was maintained at 25 and 25 cm, respectively. In the experiment eight different treatments consisting application of T1 *Metarrhizium anisopliae* (5gm/lit), T2 *Beauveria bassina* (5gm/lit), T3 Neem oil 3% (3ml/lit), T4 Spinosad 45%SC (1ml/lit), T5 *Verticillium lecani* (5gm/lit), T6 Karanjin 2% EC (2ml/lit), T7 Aloevera extract 1% (50ml/lit), and untreated control.Sprays were initiated on reaching 4-5 larvae per plant (i.e after the population reaching ETL) and shoot and fruit damage by the borer and repeated two times with 15 days interval during the crop season as and when the shoot and fruit damage exceeded 10-20 percent. Spraying was done with the help of a knapsack sprayer. Observations on larvae and shoot and fruit damage by the borer were recorded daily on 5 randomly selected plants per plot and later on number of damaged and total shoots and fruits, from these data was taken and expressed in percentage. Okra fruits were harvested at weekly intervals. The percent fruit damage was total number of affected fruits frm each plot. The total yield of the marketable fruits obtained from different treatments was calculated and converted by considering the additional cost (cost of insecticides and operational charges) and benefit (compared to untreated control) in the respective treatments.

## Results and Discussion

Among the selected treatments, Spinosad 45%SC was found effective in controlling the shoot and fruit bore population which can be recommended for management of shoot and fruit borer on okra. The values obtained in 1st spray (Table: 1) and 2nd spray (Table: 2) respectively are 5.22%, 5.86%. These result were similar to the finding reported by Gosalwad and Kawathekar (2009) [1] who reported that Spinosad 45%SC was most effective treatment The next effective treatment was *Beauveria bassiana* in which the values obtained in 1st and 2nd spray respectively are 11.63%, 12.33%.These findings was supported by Sarkar *et al*. (2015) [6] and Rajput and Tayde (2017) [4]. The efficacy of Neem oil 3% in 1st spray (Table: 1) and 2nd spray (Table: 2) respectively are 13.86%, 14.13%. These results are similar to the findings of Padwal and Kumar (2013) [3] and Pachole *et al.* (2017) [2]. *Verticillium lecani* was found to be the next effective treatment and The values obtained in 1st and 2nd spray respectively are 16.81%, 15.51%. and these findings were supported by Pachole *et al.* (2017) [2] and Sarkar *et al*. (2015) [6]. This was followed by the next best treatment which was *Metarrhizium anisopliae* in which efficacy values obtained are 17.44% and 16.06% which was supported by Tomar *et al.* (2019) [8]. The least effective treatments were Karanjin 2% EC and Aloevera extract % which was supported by Padwal and Kumar (2013) [3] and Subbireddy *et al.* (2018) [7] respectively.

As shown in (Table: 3) Maximum cost benefit ratio (1:11.1) was obtained in Spinosad 45% SC which was supported by Gosalwad and Kawathekar (2006) [1] who reported that the spinosad 45% SC recorded the high yields. Cost benefit ratio of *Beauveria bassiana* was (1:8.43) and the result was supported by Tomar *et al*. (2019) [8]. The cost benefit ratio obtained in the treatment of *Metarrhizium anisopliae* (1:7.58) *verticillium lecani* was (1:7.78) and Neem oil 3% was (1:7.88) and was supported by Pachole *et al*. (2017) [2]. The cost benefit ratio of karanjin 2% EC (1:5.46) and Aloevera extract 1% (1:5.19) was lowest and was supported by Padwal and Kumar (2013) [3] and Subbireddy *et al.* (2018) [7] respectively.

**Table 1:** To evaluate the efficacy of certain insecticides to control shoot and fruit borer (*Earias vittella*) in okra (First Spray): percent shoot infestation

| Treatment | DBS | 3 DAS | 7 DAS | 14 DAS | Mean |
|---|---|---|---|---|---|
| *Metarrhizium anisopliae* T1 | 17.75 | 16.44 | 17.76 | 18.13 | 17.44 |
| *Beauveria bassina* T2 | 16.51 | 10.47 | 11.73 | 12.76 | 11.63 |
| Neemoil 3% T3 | 17.56 | 12.92 | 13.27 | 15.39 | 13.86 |
| Spinosad 45% SC T4 | 16.51 | 4.06 | 3.81 | 7.79 | 5.22 |
| *Verticillium lecani* T5 | 19.48 | 16.23 | 16.90 | 17.30 | 16.81 |
| Karanjin 2%EC T6 | 20.24 | 18.63 | 19.40 | 21.02 | 19.68 |
| Aloevera extract 1% T7 | 20.58 | 19.32 | 20.54 | 21.21 | 20.35 |
| Control T8 | 23.90 | 23.93 | 23.93 | 25.26 | 24.37 |
| F-test | N S | S | S | S | S |
| S.Ed (±) | 3.45 | 0.95 | 0.90 | 0.84 | 1.52 |
| C.D. (P = 0.05) | 7.41 | 2.04 | 1.93 | 1.77 | 1.12 |

**Table 2:** To evaluate the efficacy of certain insecticides to control shoot and fruit borer (*Earias vittella*) in okra (Second Spray): Percent fruit infestation

| Treatment | DBS | 3 DAS | 7 DAS | 14 DAS | Mean |
|---|---|---|---|---|---|
| *Metarrhizium anisopliae* T1 | 19.07 | 14.95 | 15.89 | 17.34 | 16.06 |
| *Beauveria bassina* T2 | 17.22 | 11.47 | 12.50 | 13.04 | 12.33 |
| Neemoil 3% T3 | 16.51 | 13.48 | 14.10 | 14.83 | 14.13 |
| Spinosad 45% SC T4 | 15.52 | 5.39 | 4.45 | 7.76 | 5.86 |
| *Verticillium lecani* T5 | 17.26 | 14.33 | 15.55 | 16.67 | 15.51 |
| Karanjin 2%EC T6 | 19.48 | 16.47 | 17.47 | 18.42 | 17.45 |
| Aloevera extract 1% T7 | 20.24 | 17.97 | 18.87 | 19.43 | 18.75 |
| Control T8 | 23.86 | 24.45 | 24.01 | 24.60 | 24.35 |
| F-test | NS | S | S | S | S |
| S.Ed (±) | 2.48 | 1.52 | 1.05 | 0.87 | 1.22 |
| C.D. (P = 0.05) | 5.32 | 3.26 | 2.24 | 1.80 | 1.02 |

**Table 3:** Economics of cultivation

| Treatment | Yield q/ha | Cost of yield | Total cost of yield | Common cost | Treatment cost | Total cost | C:B ratio |
|---|---|---|---|---|---|---|---|
| Spinosad 45% SC T1 | 195.5 | 2500 | 488750 | 42728 | 1265 | 43993 | 1:11.1 |
| *Beauveria bassiana* T2 | 149.2 | 2500 | 373000 | 42728 | 1325 | 44053 | 1:8.43 |
| *Metarrhizium anisopliae* T3 | 133.2 | 2500 | 333000 | 42728 | 1175 | 43903 | 1:7.58 |
| *Verticillium lecani* T4 | 136.3 | 2500 | 341500 | 42728 | 1175 | 43903 | 1:7.78 |
| Neem oil 3% T5 | 140.2 | 2500 | 350500 | 42728 | 1715 | 44443 | 1:7.88 |
| Karanjin 2% EC T6 | 96.3 | 2500 | 240750 | 42728 | 1340 | 44068 | 1:5.46 |
| Aloevera extract 1% T7 | 92.4 | 2500 | 231000 | 42728 | 1700 | 44428 | 1:5.19 |
| Control T8 | 72.2 | 2500 | 180500 | 42728 | 00 | 42728 | 1:4.22 |

## Conclusion

The present findings conclude that treatment such as Spinosad 45% SC, *Beauveria bassiana* and Neem oil 3% were found effective against Lepidopteran caterpillar *Earias vitella* along with an additional yield level in okra when compared to other treatments.

## References


1. Gosalwad SS, Kawathekar BR. Efficacy of insecticides against okra fruitborer (*Earias vittella* Fabricius). Journal of Plant Protection Research 2009;6(2):59-63.
2. Pachole SH, Thakur S, Simon S. Comparative bioefficacy of selected chemical insecticides and bio-rationals against shoot and fruit borer [*Earias Vittella* (Fabricius)] on okra [*Abelmoschus esculentus* (L.) Moench]. Journal of Pharmacognosy and Phytochemistry 2017;6(5):1493-1495.
3. Padwal KG, Kumar A. Efficacy of plant products and combinations with cypermethrin in management of *Earias vittella* of Okra. Annals of Plant Protection sciences 2014;22(1):73-75.
4. Rajput GS, Tayde AR. Population dynamics and comparative efficacy of certain novel insecticides, botanicals and bio agents against shoot and fruit borer (*Earias vitella* Fabricius) of okra crop [*Abelmoschus esculentus* (L.) Moench]. Journal of Entomology and Zoology Studies 2017;5(4):1667-1670.
5. Rawat RR, Sahu HR. Estimation of losses in growth and yield of okra due to *Empoasca devastans* Distant and *Earias* species (India). Indian journal of Entomology 1973;3(5):252-254.
6. Sarkar S, Patra S, Samanta A. Evaluation of bio-pesticides against red cotton bug and fruit borer of okra. The Bioscan 2015;10(2):601-604.
7. Srivastava KP, Dhaliwal GS. A Textbook of Applied entomology 1993.
8. Subbireddy KB, Patel HP, Bharpoda TM. Utilization of Plant Extracts for Managing Fruit Borers in Okra, [*Abelmoschus esculentus* (L.) Moench]. International Journal of Current Microbiology and Applied Sciences 2018;7(5):2786-2793.
9. Tomar RKS, Kumar DC, Awasthi AK, Kerkatta A. Field efficacy of different insecticides and bio pesticides against okra shoot and fruit borer. Journal of Pharmacognosy and Phytochemistry 2019;8(1):2623-2625.
10. Yadav R, Kumar S, Sanp RK. Efficacy of certain botanical insecticides against shoot and fruit borer, *Leucinodes orbonalis* (Guenee) on brinjal (*solanum melongena* L.) The Bioscan 2015;10 (3):987-990.
11. Yadav S, Ramkewal GP, Singh RS, Vikrant. Effect of certain eco-friendly insecticides on *Earias vitella* (major insectides) of okra crop in central region of Uttar Pradesh, India. Plant Archives 2017;17(1):135-140.