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## Spinosad for control of brinjal shoot and fruit borer: Efficacy and economics

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### Abstract

Brinjal is one of the important vegetable crops in India. Brinjal shoot and fruit borer (BSFB) (*Leucinodes orbonalis*) is important insect pest of brinjal, because it causes huge yield losses. Field experiment was conducted to evaluate the efficacy and economics of the naturally derived insecticide, Spinosad 45%SC over the locally used insecticides against the BSFB. The result of the experiment confirms that the shoot infestation was lowest in the Spinosad treated field and the yield was also higher with its application over the control and other treatment.

**Keywords:** brinjal fruit and shoot borer, BSFB, control, spinosad

### Introduction

Brinjal (*Solanum melongena*) is one of the most economically important vegetable crop among the farmers of India. The average productivity of brinjal in India is 174 Q/ha (Ministry of Agriculture & Farmers Welfare, GOI, 2018-2019). A number of insect pests attack the brinjal crop from the time of planting to its harvesting stage. Some of the important insect pests of brinjal are brinjal shoot and fruit borer (BSFB) (*Leucinodes orbonalis*), jassid (*Amrasca bigutulla bigutulla*), white fly (*Bemisia tabaci*), coccinellid beetle (*Epilachna vigintioctopunctata*) and aphid (*Aphis gossypii*)<sup>[1]</sup>.

Brinjal shoot and fruit borer (BSFB) is a major pest of brinjal<sup>[2, 3]</sup> and is found in all brinjal producing countries<sup>[4]</sup>. BSFB is one of the most important insect-pest of brinjal in Asia, especially in India, Pakistan, Bangladesh, Sri Lanka, Nepal, Thailand, Philippines and South-East Asia<sup>[5]</sup>. Areas with hot and humid climatic conditions are most conducive for BSFB incidence and its distribution<sup>6</sup>. BSFB causes severe damage in brinjal crop in South Asia<sup>[7]</sup>. The yield losses due to BSFB may reach up to 85 to 90 percent<sup>[8, 9]</sup>. The larvae of BSFB bore into the tender shoots of the brinjal crop at vegetative stage, flowering and fruiting stage<sup>[5]</sup>. It is reported that the infestation of the petiole and midrib of leaves causes withering and drooping of young leaves and shoots<sup>[10, 11]</sup>. But after the fruit setting the shoot infestations become negligible<sup>[12]</sup>. The larvae after infestation bore inside fruit and the entrance hole is plugged by excreta of the larvae<sup>[13]</sup>. The BSFB larvae feed on the mesocarp part of the fruit and the feeding and excretion inside results in rotting of the fruit<sup>[14]</sup>, making it unfit for human consumption<sup>[15]</sup>. On an average 4 to 7 brinjal fruits can be infested by a single larva in its life cycle<sup>[16, 17]</sup>.

BSFB has become a serious insect pest in brinjal growing areas of India. In the villages of Bihar state of India many farmers are applying insecticides twice a week for the control of BSFB. The extensive use of the random insecticides reduces the efficacy of chemicals against the BSFB and increases the cost of production. Since several health hazardous effects are related with the chemical insecticides having residual effects, there is a need to opt an environmentally safe insecticide or less number of sprays and doses of insecticides. The present study was carried out to evaluate the efficacy and to calculate the production economics of a naturally derived insecticide over the locally used insecticide, and to find the best practice if insecticides have to be used as management practice against the borer BSFB.

### Materials and Methods

Field trials were conducted to find the efficacy and economics of Spinosad against brinjal shoot and fruit borer over local traditional practices. The field trials were conducted at Krishi Vigyan Kendra, Begusarai farm as well as at farmers' field in Rabi season of 2019-2020 under

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front line demonstration activity of KVK. Fields were divided in three equal parts. First part was used as control plot, which means it was not sprayed with any chemicals to control the pest. Second part was sprayed with the insecticide Imidacloprid 17.8%SL which was being used mostly by the farmers in Begusarai district. Third part was sprayed with Spinosad 45%SC (trade name- One-Up). First application of insecticide was done after eighth week of transplantation. Three sprays were done with both the insecticide and spraying was repeated at 12 days interval. Observation data for efficacy were calculated with the productivity and economics of production. Productivity data has been taken in quintals per hectare (Q/ha). For computation of economics current market price of brinjal and cost of seed, fertilizer, labour and insecticides were considered.



Fig 1: Front line demonstration of Spinosad at KVK



Fig 2: Farmers provided with Spinosad for demonstration at KVK

### Results and Discussion

The comparative effectiveness of both the treatments was analyzed by shoot infestation caused by brinjal shoot and fruit borer. Among both the selected insecticides the shoot infestation was lowest in the plot treated with Spinosad 45%SC. The highest shoot infestation was observed in the control plot. Adiroubane and Raghuraman (2006) [18] findings also suggests that Spinosad 45SC was efficiently reducing the shoot infestation over the control. The effects of different insecticidal application on brinjal shoot and fruit borer infestation have direct influence on yield of brinjal. The fruit yield obtained from Spinosad treated plot was around 250 Q/ha while from Imidacloprid treated plot it was 240 Q/ha and from control plot it was 230 Q/ha. Hence accordingly income from Spinosad treated plot was Rs. 410000/ha, from Imidacloprid treated plot was Rs. 380000/ha and from control plot it was Rs.340000/ha (Table 1). In a field experiment conducted by Patra *et al.* (2009) [19] similar findings were

reported that the highest yield of brinjal was recorded in Spinosad treated field. These results indicated that, Spinosad 45% SC was most effective in protecting the brinjal crop against the brinjal shoot and fruit borer, while Imidacloprid 17.8%SL was moderately effective to control the pest.

Table 1: Yield and Income of brinjal crop from different treatment against BSFB

Plot	Yield (Q/ha)	Income (Rs/ha)
Control	230	340000
Imidacloprid	240	380000
Spinosad	250	410000

### Conclusions

From this study, it can be concluded that Spinosad 45%SC is the most effective insecticide to protect the brinjal crop from brinjal shoot and fruit borer (BSFB) in the field and to ensure the higher yield in per unit area.

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