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Persistent Effect of *Bacillus Thuringiensis* var. Kurstakion Okra

V. S. Desai
Assistant Professor,
Deptt. of Agricultural Entomology,
College of Agriculture,
Dapoli

Neha S. Dalvi
Senior Researcher Assistant,
Deptt. of Agricultural Entomology,
College of Agriculture,
Dapoli.

M.M. Kulkarni
Assistant Professor,
Deptt. of Horticulture,
College of Agriculture,
Dapoli

A.J. Mayekar
Assistant Professor,
Deptt. of Animal Husbundry,
College of Agriculture,
Dapoli

Abstract

A field-cum-laboratory study was carried out to assess the persistent toxicity of Btk against third instar larvae of *E. vittella* on okra fruits.Data revealed that the okra fruits treated with Btk caused the mortality of *E. vittella* larvae upto seven days of application. The larval mortality became half within 3 days of application. Thus, the present study on persistent effect of Btk against third instar larvae of *E. vittella* on okra fruits indicated that the larval mortality was observed higher upto 3 days of application. However, the Btk remained active upto 7 days of application.

Keywords: *Bacillus thuringiensis,* Persistent, Okra.

Introduction

As okra is one of the high value and preferred vegetable crops by farming community, chemical control is largely practiced for monetary benefit. Pesticides are undoubtedly effective for averting pest attacks on okra, but the shorter interval between pickings of okra fruits resulted in leaving toxic residues that rendered okra fruits unsafe for consumption. Moreover, indiscriminate use of pesticides resulted in resurgence of sucking pests, development of pesticide resistance in target insects, destruction of natural enemies and beneficial non-target organisms. The indiscriminate and massive upsurge of pesticides has grossly poisoned almost every component of biosphere. To overcome these problems, it is highly necessary to explore effective method of insect control without having harmful effects and can be well suited in the Integrated Pest Management Programme.In this context, an alternative strategy like use of biopesticides has come up into vogue during the last two decades. Biopesticides have high target selectivity, environmental compatibility, economic viability, novel mode of action, and are considered much safer to environment and other beneficial organisms as well as rational approach at a long run.*Bacillus thuringiensis* var. kurstaki (Btk) is a naturally occurring soil bacteria ideal for controlling tent caterpillars, gypsy moth, cabbage looper, tomato hornworm and other leaf eating caterpillars on trees, shrubs, tomatoes and other vegetables. Btk is most effective when applied to caterpillars during their early instars, when they are still small. It must be ingested by the insect, as it is a stomach toxin, harmless to humans, animals and beneficial insects. Btk biodegrades quickly in sunlight and may require reapplication under heavy insect pressure. It was therefore necessary to evaluate the Btk for their persistence in okra.

Materials and Methods

A field-cum-laboratory trial was conducted to study the persistent effect of Btk on okra fruits. For this purpose Btk suspension 0.2 per cent was sprayed on okra plants in the field with the help of automizer. Okra fruits from treated plot were collected on 1, 2, 3, 5, 7, 10 and 15 days after application. One day starved third instar larvae were kept in plastic jars (14.5 cm height x 8.5 cm diameter) and allowed to feed on these treated okra fruits for 24 hours, and then the fresh, untreated okra fruit slices were provided daily to the larvae for feeding. Ten larvae were used in each treatment and each treatment was repeated for four times. The experiment was carried out in C.R.D. The larval mortality was recorded at 1,2,3 and 4 days after exposure. The larval mortality was then converted into per cent larval mortality.

Results and Discussion

A field-cum-laboratory study was carried out to assess the persistent toxicity of Btk against third instar larvae of *E. vittella* on okra fruits. The larval mortality data obtained are summarized in Table 1 and graphically depicted in Fig. 1.

Perusal of data from Table 1 revealed that after one day of feeding, the fruit samples collected one day after application recorded 8.13 per cent larval mortality and was at par with fruit samples collected at 2 and 3 days by recording 6.25 and 4.38 per cent larval mortality, respectively.

After two days of feeding the highest larval mortality (32.50 %) was observed in the treatment from which fruit samples were collected after one day of Btk application and it was at par with sample collected after two days (27.50 %). Fruit sample collected three days after Btk application recorded 17.50 per cent larval mortality. The samples collected at 5 and 7 days after treatment recorded 8.13 and 4.38 per cent larval mortality, respectively.

After three days of feeding the samples collected at 1, 2, 3, 5 and 7 days after Btk application recorded 62.50, 52.50, 45.00, 17.50 and 10.00 per cent larval mortality, respectively.

After four days of feeding the okra fruit samples collected 1, 2, 3, 5 and 7 days after Btk application recorded 72.50, 57.50, 45.00, 25.00 and 10.00 per cent larval mortality, respectively. There was no mortality recorded at 10 and 15 days after application.

The overall data revealed that the okra fruits treated with Btk caused the mortality of *E. vittella* larvae upto seven days of application. The larval mortality became half within 3 days of application. Thus, the present study on persistent effect of Btk against third instar larvae of *E. vittella* on okra fruits indicated that the larval mortality was observed higher upto 3 days of application. However, the Btk remained active upto 7 days of application.

Earlier, Rajamohan and Jayaraj (1978) reported that Bt sprays persisted for less than ten days on cabbage. Beggle*et al.*(1981) reported that insecticidal activity of Btk become half within two days on cotton leaves. Bertona*et al.*(1994) observed that Bt remained active for 7-10 days and its degradation was mainly due to light and temperature. Li and Fitzpatrick (1996) reported that Btk exhibited significantly longer residual toxicity at higher application doses. The half life of Btk ranged from 2.45 to 6.68 days. Mahapatro and Gupta (1999) found the persistent of Btwas upto 7 days. The present findings on persistent effect of Btk on okra are in conformity with the reports of earlier reporters.

Table - 1
Larval mortality of *Earias vittella* at different days of *Bacillus thuringiensis* var kurstaki application on okra

Fruit sample collected after days of Btk application	Larval mortality (%) after days of feeding			
	1	2	3	4
1	16.10* (8.13)	34.72 (32.50)	52.27 (62.50)	58.45 (72.50)
2	13.77 (6.25)	31.55 (27.50)	46.44 (52.50)	49.33 (57.50)
3	11.43 (4.38)	24.53 (17.50)	42.12 (45.00)	42.12 (45.00)
5	9.10 (0.00)	16.10 (8.13)	24.53 (17.50)	29.89 (25.00)
7	9.10 (0.00)	11.43 (4.38)	18.44 (10.00)	18.44 (10.00)
10	9.10 (0.00)	9.10 (0.00)	9.10 (0.00)	9.10 (0.00)
15	9.10 (0.00)	9.10 (0.00)	9.10 (0.00)	9.10 (0.00)
SEm. ±	1.61	1.69	1.27	1.27
C.D. at 5 %	4.74	4.98	3.73	3.74

* Arcsin√percentage transformation
Figures in parentheses are original values

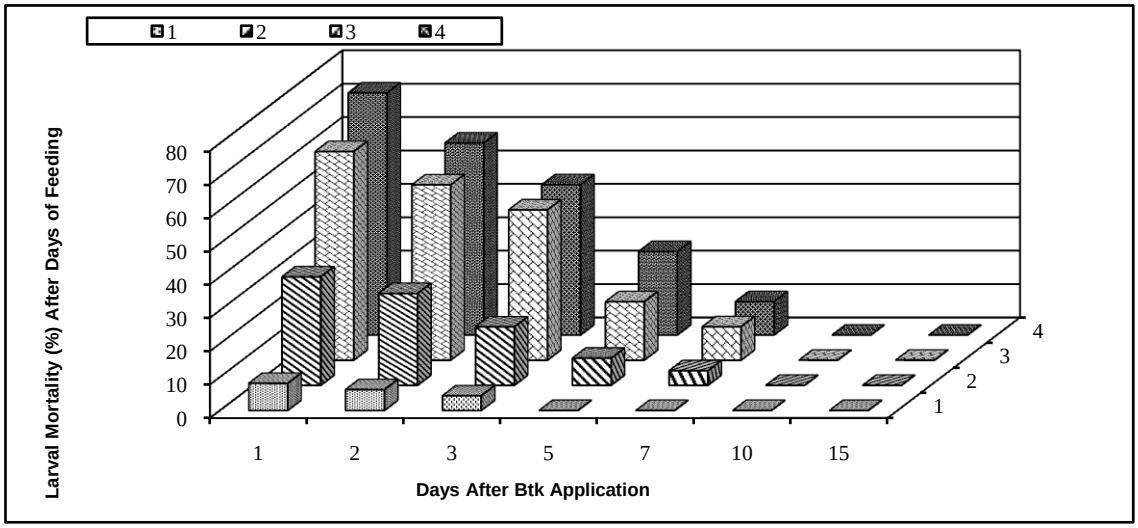

Fig. 1 Larval mortality of *E. vittella*at days after Btk feeding

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