Research Paper :

Performance of some insectides against *Leucinodes orbonalis* G.

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SUMMARY

Emamectin benzoate, novaluron, diflubenzuron, *Bacillus thuringiensis* and untreated control were evaluated for bioefficacy and impact on coccinellides on brinjal crop by conducting field experiment in *Kharif,* 2007. Emamectin benzoate treatment was significantly superior recorded 5.00 per cent shoot damage over diflubenzuron and *BtK*, It was followed by novaluron which exhibited 5.78 (59.66 per cent reduction) per cent shoot damage. The percentage mortality of larvae from the treatment was maximum in emamectin benzoate with a mean of 11.51 and 11.44 per cent fruit damage (57.24 and 57.12 per cent reduction in damage) on number and weight basis, respectively. Novaluron significantly reduced fruit damage (53 and 54 per cent reduction on number and weight basis, respectively). Maximum coccinellides population recorded in untreated control and *BtK* was 4.16 and 3.22, respectively. It was followed by emamectin benzoate and novaluran which recorded 2.24 and 1.80, respectively. The yield of healthy fruits in emamectin benzoate and novaluran treated plots were recorded 24.06 and 23.14 t ha^{-1}, respectively.

Key words : *Leucinodes orbonalis*, Brinjal, Coccinellides, *Bacillus thuringiensis*

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Brinjal, the king of vegetable, is an important crop because of its nutritional, medicinal as well as commercial value. Brinjal or egg plant (*Solanum melongena* Linn.) belonging to family Solanaceae is native of India. It is available every where at reasonable price hence is known as 'poor man's vegetable'. On hundred gram of edible part of brinjal has a potential to supply 40 g carbohydrates, 1.4 g protein, 0.3 g of minerals and vitamins *viz*., A, B, and C (Aycord, 1983). It is well known for its medicinal value against liver complaints, toothache, diabetes and also it is a good appetizer (Choudhary, 1977). Vevai (1970) reported invasion of brinjal crop by 26 pests in India, Amongst these, shoot and fruit borer, *Leucinodes orbonalis* Guenee (Pyralidae : Lepidoptera) is important one. The shoot and fruit borer of brinjal has been reported through out the country (Patel and Basu, 1948). It is most destructive and active throughout the year, particularly under high temperature and humid conditions causing great damage. The larvae of *L. orbonalis* bore into the young axillary shoots, causing wilting and enter the fruits unobtrusively, with small enhanced holes plugged with excreta. This pest accounts for 40.11 per cent of shoot infestation and 62.50 and 55.40 per cent fruit infestation on number and weight basis, respectively (Tripathi *et al*., 1996). For effective management of the pest, the present study was taken to evaluate the some insecticides against brinjal shoot and fruit borer and predadary coccinellides.

MATERIALS AND METHODS

The present investigation was carried out at Instructional Farm, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri during *Kharif* 2008 in Randomized Block Design. Five treatments were evaluated *viz*.**,** diflubenzuron 50 g, novaluron 25 g, *Bacillus thuringiensis* 500 g, emamectin benzoate 10 g a.i. and untreated control with four replications. Five sprays of insecticides were undertaken at 45, 60, 75, 90 and 105 days after transplanting during morning times using Knapsack sprayer. Pre-treatment observations were recorded 24 hours before application of treatment and post treatment observations were recorded on 3, 7 and 10 days after spraying. The fruit damage was recorded at each picking. The shoot and fruit infestations were recorded by counting total number of healthy and infested shoots and fruits on randomly selected and tagged five plants in each treatment. The total number of coccinellides were recorded on the randomly selected and tagged ten plants in each treatment at 3, 7 and 10 days after spraying. Thus, the data generated were

subjected to statistical analysis.

RESULTS AND DISCUSSION

The data on cumulative efficacy (Table 1) of pesticides after I, II and III spray against BSFB on the basis of shoot damage revealed that emamectin benzoate showed relatively lower infestation when compared to other treatments. It was followed by novaluron, diflubenzuron and *Bt*k which recorded less per cent shoot damage. Obviously, the maximum per cent shoot damage was observed in untreated control. Overall mean data of pesticides showed that emamectin benzoate was significantly superior over diflubenzuron and *BtK* which recorded less per cent damage of shoot (5.00) and it was at par with novaluron (5.78). Diflubenzuron and *Btk* exhibited 7.14 and 8.38 per cent shoot damage, respectively. Maximum per cent shoot damage was found in untreated control (14.33 per cent).

The data (Table 2) on cumulative efficacy of pesticides after 3rd, 4th and 5th spray against BSFB based on fruit damage indicated that all the treatments were significantly superior over untreated control. The best effective treatment was emamectin benzoate which recorded minimum per cent fruit damage (11.51 on number basis and 11.44 per cent on weight basis). It was followed by novaluron which proved next effective treatment to control fruit damage infestation done by BSFB recorded 12.75 and 12.41 per cent on number and weight basis, respectively. Diflubenzuron and *BtK* treatment recorded 13.65, 15.57 and 14.46, 16.50 per cent fruit damage on number and weight basis, respectively. Maximum per cent fruit damage was observed in untreated control (26.92 per cent on number basis and 26.68 per cent on weight basis). The yield of healthy fruits in emamectin benzoate

Table 1 : Efficacy of pesticide treatments against brinjal shoot and fruit borer based on shoot damage

Treatments	Mean per cent infested shoots				Mean coccinellides population/10 plants
	I st spray	II nd spray	III rd spray	Overall mean	
Diflubenzuron 25 WP @ 50 g a.i. ha^{-1}	11.96 (20.14)	7.24 (15.50)	2.22 (8.42)	7.14 (14.68)	1.55 (1.36)
Novaluron 10 EC @ 25 ml a.i. ha^{-1}	11.06 (19.27)	4.95 (12.63)	1.35 (6.69)	5.78 (12.86)	1.80 (1.45)
*Bt*k 11 WG @ 500 g ha^{-1}	13.00 (21.06)	8.97 (17.31)	3.18 (10.13)	8.38 (16.16)	3.22 (1.89)
Emamectin benzoate 5 SG @ 10 g a.i. ha^{-1}	10.30 (18.54)	3.70 (10.87)	1.01 (5.94)	5.00 (11.78)	2.24 (1.50)
Untreated control	16.77 (24.33)	17.83 (24.96)	8.39 (16.70)	14.33 (21.99)	4.16 (2.12)
S.E. ±	0.64	0.69	0.55	0.62	0.18
C.D. (P=0.05)	1.99	2.14	1.72	1.95	0.57

Figures in parenthesis are arc sine transformed values.
Figures in parenthesis are square root transformed values of coccinellides population

Table 2 : Efficacy of pesticide treatments against brinjal shoot and fruit borer based on fruit damage

Treatments	Mean per cent infested fruits						Overall mean		Yield (t ha^{-1})
	3 st spray		4 nd spray		5 rd spray				
	Number basis	Weight basis	Number basis	Weight basis	Number basis	Weight basis	Number basis	Weight basis	
Diflubenzuron	15.98	16.48	13.04	13.60	11.95	13.31	13.65	14.46	22.26
25 WP @ 50 g a.i. ha^{-1}	(23.41)	(23.71)	(20.90)	(21.34)	(20.18)	(21.23)	(21.49)	(22.09)	
Novaluron 10 EC @ 25 ml	14.59	15.00	12.19	11.22	11.47	11.03	12.75	12.41	23.14
a.i. ha^{-1}	(22.22)	(22.54)	(20.23)	(19.74)	(19.61)	(19.31)	(20.68)	(20.53)	
*Bt*k 11 WG @ 500 g ha^{-1}	18.68	19.25	15.24	15.20	12.79	15.06	15.57	16.50	20.53
	(26.83)	(25.95)	(22.91)	(22.01)	(20.77)	(22.69)	(23.50)	(23.55)	
Emamectin benzoate 5 SG	13.19	13.61	11.32	10.95	10.04	9.78	11.51	11.44	24.06
@ 10 g a.i. ha^{-1}	(20.97)	(20.72)	(19.41)	(19.17)	(18.40)	(18.11)	(19.59)	(19.33)	
Untreated control	27.08	28.28	27.74	27.62	25.96	24.16	26.92	26.68	17.17
	(31.24)	(31.98)	(31.58)	(31.92)	(30.56)	(30.77)	(31.12)	(31.55)	
S.E. ±	1.35	1.14	1.77	1.72	1.53	1.28	1.55	1.38	
C.D. (P=0.05)	4.18	3.53	5.49	5.34	4.69	3.97	4.78	4.28	

Figures in parenthesis are arc sine transformed values

plots was 24.06 t ha^{-1}. The lowest fruit yield was recorded in untreated control which recorded 17.17. Novaluron and diflubenzuron recorded 23.14 and 22.26 t ha^{-1}, respectively. Minimum yield was recorded in *Bt*K plots (20.53). Emamectin benzoate proved most effective against fruit borer and this treatment produced highest maximum marketable fruit yield. These results are similar to those reported by Udikeri *et al.* (2004) and Bheemanna *et al.* (2005). Novaluron provided the best protection against fruit borers. These results were agreed with Chatterjee and Roy (2004). Diflubenzuron was found to be quite effective against BSFB as compared to the *Bt*K and untreated control. (Srivastava *et al.,* 2007). Treatment with *Bt*K was found to be less effective against BSFB as compared to the other treatments. This result is agreed with Vadodaria *et al.* (1999).

Maximum coccinellides population was recorded in untreated control and *Bt*k was 4.16, and 3.22, respectively. It was followed by emamectin benzoate and novaluron which recorded 2.24 and 1.80, respectively. Lowest coccinellides population density was observed in diflubenzuron treatment which recorded 1.55. Maximum mean numbers of lady bird beetles was observed in *BtK* treatment. It has no adverse effects on beneficial arthropods (Garcia, 1991). *Bt* was safe to the natural enemies of cotton pests and more emergence of parasitoids of cotton bollworms *viz., Apanteles ageleti* and *Bracon greeni* was observed (Nikam, 1997). Proclaim (emamectin benzoate) did not affect natural enemies populations at recommended doses (Kulkarni and Adsule, 2007). Zaki and Geshraha (1987) reported that diflubenzuron had little effect on the activity of *Trichogramma* spp., *Coccinell* spp. and *Chrysoperla carnea*. Chatterjee and Roy (2004) agreed with these results.

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