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Bioefficacy of new pesticides against bollwarm complex of cotton (*Gossypium* spp.)

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ABSTRACT

An investigation was undertaken with an objective to evaluate bioefficacy of new pesticides *viz.*, lambda-cyhalothrin 5 EC, spinosad 45 SC, indoxacarb 14.5 SC, profenofos 50 EC, Dipel 8L (B.t formulation) along with endosulfan 35 EC and NSKE 5% against bollworms of cotton. Three sprays of insecticide treatments were given at an interval of 20 days by initating the first 45 days after sowing. All the insecticides were found effective against bollworms of cotton. Among the insecticide treatments lambda-cyhalothrin 5 EC @ 100 g a.i/ha was found most effective against cotton bollworms in which square and green boll damage was observed in the range of 8.49 to 10.22 and 10.12 to 12.42 per cent, respectively as against maximum in untreated control(24.90 to 27.11 and 26.80 to 29.23, respectively) in all three sprays . The minimum locule damage of 11.92 per cent was recorded in the same treatment. However, this treatment was at par with indoxacarb 14.5 SC @ 75 g a.i/ha, spinosad 45 SC @ 75 g a.i/ha and profenofos 50 EC @1000 g a.i/ha. All the insecticide treatments recorded significantly higher seed cotton yield in the range of 1371 to 1931 kg/ha as against 968 kg/ha in untreated control. New pesticides *viz.*, lambda-cyhalothrin 5 EC, indoxacarb 14.5 SC, spinosad 45 SC and profenofos 50 EC were found highly effective against cotton bollworms.

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Cotton is one of the most important cash crop of India, which account for about 50% of total fibre consumption of the world, while cotton is the second largest source of edible oil after soyabean. Introduction of high yielding cultivars has increased the pest problems on cotton. In the vegetative phase, the crop is attacked by sucking pest, where as squaring stage onwards, the bollworm complex *viz.*, the spotted bollworm (*Earias vittella* Fab. and *Earias insulana* Boisd.), pink bollworm (*Pectinophora gossypiella* Sannd.) and American boll worm (*Helicoverpa armigera* Hub.) posses a serious threat to cotton cultivation. American bollworm damages 12.60 % squares, 4.5 % flowers and 2.8 % bolls per plant and *Earias spp*. causes 40 % losses in cotton yield (Veeresh,1980). Pink bollworm causes about 50 % loss in yield (Atwal,1986). Bollworm complex constituting spotted bollworm, American bollworm and Pink bollworm are the most serious and destructive pests of cotton causing 60-70 per cent loss in seed cotton yield (Joshi *et al.*, 1967 and Sohi, 1964). By considering the threat of this pest, the present investigation was undertaken to study bio-efficacy of new pesticides against boll worm complex of cotton.

MATERIALS AND METHODS

An experiment was conducted on the high yield cotton cultivar NHH-44 during summer, 2004-05 at central campus farm, Mahatma Phule Krishi Vidyapeeth, Rahuri. Randomized Block Design with three replications and eight treatments was adopted. The net plot size was 5.40 x 2.70 with 90 x 90 cm plant spacing. Three applications of insecticides sprays were given at an interval three weeks starting from 45 days after sowing with the help of knapsack sprayer. The observation on bollworm infestatioin in fruiting bodies (squares and green bolls) and in locules were recorded at harvest and percentage of infestation was worked out. Finally yield of seed cotton of all pickings in the plots treated with various treatments were recorded in kg/ha. The data were subjected to statistical analysis.

RESULTS AND DISCUSSION

All insecticides were found significantly superior over untreated control in reducing the squares and green bolls damage due bollworm complex of cotton as presented in Table 1. The treatment with lambda-cyhalothrin 5EC @ 100 g a.i /ha proved significantly superior with lowest square damage and green boll damage of 9.72 and 11.76 per cent, respectively. This treatment however, was at par with indoxacarb 14.5 SC @ 75 g a.i /ha, spinosad 45 SC 75 g a.i /ha and profenofos 50 EC 1000 g a.i /ha which recorded 10.62, 10.69, and 11.23 per cent square damage and 12.62, 12.88, and 13.42 per cent green boll damage, respectively. Lambda-cyhalothrin 5EC @ 100 g

Table 1 : Bio-efficacy of new pesticides against bollworm complex infestation in squares and bolls after first spray

Sr. No.	Treatments	Dose g a.i./ha	Pre count		Square damage			Boll damage		
			Square damage%	Bolls damage %	2 DAS	7 DAS	14 DAS	2 DAS	7 DAS	14 DAS
1.	Lanbda-cyhalothrin 5EC	100	11.96 (20.27)	10.84 (19.19)	9.72 (18.15)	9.83 (18.24)	10.22 (18.44)	11.76 (20.09)	12.22 (20.44)	12.42 (20.62)
2.	Spiniosad 45 SC	75	12.18 (20.44)	11.26 (19.55)	10.69 (19.09)	10.72 (19.09)	11.02 (19.37)	12.88 (21.05)	13.12 (21.22)	13.28 (21.39)
3.	Indoxacarb 14.5 SC	75	11.93 (20.18)	10.17 (18.63)	10.62 (19.00)	10.74 (19.09)	11.16 (19.55)	12.62 (20.79)	12.88 (21.05)	13.12 (21.22)
4.	B.t 8 L/ha	1000 ml	13.07 (21.22)	11.67 (19.91)	15.22 (22.95)	15.94 (23.50)	16.08 (23.66)	17.52 (24.73)	17.78 (24.95)	18.10 (25.18)
5.	Profenofos 50 EC	1000	12.86 (20.96)	11.34 (19.64)	11.23 (19.55)	11.48 (19.82)	11.62 (19.91)	13.42 (21.47)	13.84 (21.81)	14.10 (22.06)
6.	NSKE 5 %	25 kg	13.00 (21.13)	10.97 (19.37)	15.74 (23.26)	16.12 (23.66)	16.29 (23.81)	17.84 (24.95)	18.12 (25.18)	18.32 (25.33)
7.	Endosulfan 35 EC	700	12.16 (20.44)	10.86 (19.19)	14.78 (22.63)	14.78 (22.63)	15.14 (22.95)	16.56 (24.05)	16.82 (24.20)	17.06 (24.43)
8.	Untreated control	-	12.39 (20.62)	10.22 (18.63)	24.90 (29.93)	25.82 (30.53)	25.42 (30.26)	26.80 (31.18)	27.22 (31.44)	27.58 (31.69)
	S.E.±	-	0.79	0.36	1.01	1.06	1.10	0.72	0.70	1.07
	C.D. (P=0.05)	-	N.S	N.S	3.08	3.22	3.36	2.18	2.04	3.27

Table 2 : Bio-efficacy of new pesticides against bollworm complex infestation in squares and bolls after second spray

Sr. No.	Treatments	Dose g a.i./ha	Square damage			Boll damage		
			2 DAS	7 DAS	14 DAS	2 DAS	7 DAS	14 DAS
1.	Lanbda-cyhalothrin 5EC	100	9.23 (17.66)	9.25 (17.95)	9.65 (18.02)	11.22 (19.55)	11.76 (20.09)	11.68 (20.00)
2.	Spiniosad 45 SC	75	10.42 (18.81)	10.68 (19.09)	10.76 (19.19)	12.68 (20.88)	12.82 (20.96)	13.04 (21.13)
3.	Indoxacarb 14.5 SC	75	10.05 (18.44)	10.26 (1872)	10.49 (18.91)	12.32 (20.53)	12.66 (20.79)	12.88 (21.05)
4.	B.t 8 L/ha	1000 ml	14.82 (22.63)	15.12 (22.87)	15.36 (23.11)	16.60 (24.04)	16.82 (24.20)	17.16 (24.50)
5.	Profenofos 50 EC	1000	10.78 (19.19)	11.04 (19.37)	11.28 (19.64)	12.72 (20.88)	13.18 (21.30)	13.42 (21.47)
6.	NSKE 5 %	25 kg	15.46 (23.19)	15.12 (22.87)	16.20 (23.73)	17.48 (24.73)	17.72 (24.88)	18.08 (25.18)
7.	Endosulfan 35 EC	700	14.22 (22.14)	14.48 (22.38))	14.70 (22.55)	16.14 (23.66)	16.38 (23.89)	16.74 (24.12)
8.	Untreated control	-	25.72 (30.46)	26.52 (30.98)	26.72 (31.11)	27.82 (31.82)	28.42 (32.20)	28.78 (32.46)
	S.E.±	-	1.01	0.82	0.53	0.82	1.07	1.15
	C.D. (P=0.05)	-	3.07	2.48	1.62	2.49	3.27	3.49

a.i /ha retained superiority seven days and forteen days after first spray.

Two days after second spray the treatment with lambda-cyhalothrin 5EC @ 100 g a.i /ha proved to be highly effective over rest of the treatments and recorded 9.23 per cent square and 11.22 per cent green boll damage (Table 2). However, it was at par with indoxacarb 14.5 SC @ 75 g a.i /ha, spinasad 45 SC @ 75 g a.i /ha and profenofos 50 EC 1000 g a.i /ha recorded 10.05,10.42 and 10.78 per cent square damage and 12.32,12.68 and 12.72 per cent green boll damage, respectively. Almost similar trend of efficacy in case of square and boll damage was noticed on seven and fourteen days after second spray.

In case of boolworm infestation two days after third spray in green bolls it is evident that the treatment with lambda-cyhalothrin 5EC @ 100 g a.i /ha retained its superiority with bollworm infestation of 10.12 per cent

Table 3 : Bio-efficacy of new pesticides against bollworm complex infestation in squares and bolls after third spray

Sr. No.	Treatments	Dose g a.i./ha	Square damage 2 DAS	Square damage 7 DAS	Square damage 14 DAS	Boll damage 2 DAS	Boll damage 7 DAS	Boll damage 14 DAS
1.	Lanbda-cyhalothrin 5EC	100	8.49 (16.95)	8.61 (17.05)	8.83 (17.26)	10.12 (18.53)	10.40 (18.81)	10.72 (19.09)
2.	Spiniosad 45 SC	75	9.50 (17.95)	9.68 (18.15)	9.82 (18.24)	11.40 (19.73)	11.72 (20.00)	11.99 (20.27)
3.	Indoxacarb 14.5 SC	75	9.26 (17.76)	9.43 (17.85)	9.69 (18.15)	11.23 (19.55)	11.63 (19.91)	11.82 (20.18)
4.	B.t 8 L/ha	1000 ml	14.12 (22.06)	14.32 (22.22)	14.68 (22.55)	16.24 (23.73)	16.52 (23.97)	16.74 (24.12)
5.	Profenofos 50 EC	1000	10.08 (18.53)	10.25 (18.63)	10.43 (18.81)	12.21 (20.44)	12.61 (20.79)	12.87 (21.05)
6.	NSKE 5 %	25 kg	14.42 (22.30)	14.63 (22.46)	15.11 (22.87)	16.48 (23.97)	16.68 (24.12)	17.06 (24.43)
7.	Endosulfan 35 EC	700	13.23 (21.30)	13.42 (21.47)	13.68 (21.72)	15.12 (22.87)	15.42 (23.11)	15.07 (22.87)
8.	Untreated control	-	27.11 (31.27)	26.72 (31.11)	26.38 (30.92)	29.23 (32.71)	28.74 (32.39)	28.32 (32.14)
	S.E.±	-	0.76	1.26	0.95	0.83	1.07	1.14
	C.D. (P=0.05)	-	2.31	3.84	2.90	2.51	3.25	3.47

and 8.49 per cent square damage (Table 3). However, it was at par with indoxacarb 14.5 SC @ 75 g a.i /ha, spinosad 45 SC @75 g a.i /ha and profenofos 50 EC @ 1000 g a.i/ha for square and boll damage of cotton. Also the similar results was obtained at seven and fourteen days after third spray.

Table 4 : Bio-efficacy of new pesticides against bollwarm complex infestation in locules and seed cotton yield

Sr. No.	Treatments	Dose g a.i./ha	Locule damage	Seed cotton yield Kg/ha
1.	Lanbda-cyhalothrin 5EC	100	11.92 (20.18)	1913
2.	Spiniosad 45 SC	75	12.83 (20.96)	1794
3.	Indoxacarb 14.5 SC	75	12.72 (20.88)	1865
4.	B.t 8 L/ha	1000 ml	18.01 (25.10)	1518
5.	Profenofos 50 EC	1000	13.42 (21.47)	1734
6.	NSKE 5 %	25 kg	17.85 (24.95)	1371
7.	Endosulfan 35 EC	700	16.82 (24.20)	1630
8.	Untreated control	-	26.88 (31.24)	968
	S.E.±	-	0.83	23.82
	C.D. (P=0.05)	-	2.53	72.27

The effectiveness of lambda-cyhalothrin, spinosad and indoxacarb as observed in present investigation are in conformity with Brickle *et al.* (1999) and Dhonde (2003) who reported that lambda-cyhalothrin, indoxacarb and spinosad were most effective against bollworms. Similarly, Johnson *et al.* (1997) and Dandale *et al.* (2000) observed that spinosad was quite effective in reducing infestation of bollworms and increasing yield of seed cotton. Lavekar (2001) reported that lambda cyhalothrin 5 EC and profenofos 50EC were most effective in controlling bollworms.

The data presented in the Table 4, show that the treatment with lambda-cyhalothrin 5 EC @ 100 g a.i/ha has proved to be highly effective against bollworm with locule damage of 11.92 per cent and produced the highest seed cotton yield 1913 kg/ha. However, it was at par with indoxacarb 14.5 SC @ 75 g a.i/ha, spinosad 45 SC @ 75 g a.i/ha and profenofos 50 EC1000 g a.i/ha in which 12.72, 12.83 and 13.42 per cent locule damage was recorded, respectively while it was next promising treatment for seed cotton yield and recorded 1865, 1794, and 1734 kg/ha, respectively as against lowest in untreated control (968 kg/ha).

In present investigation, lambda-cyhalothrin 5 EC @ 100 g a.i/ha was found to be most effective in reducing locule damage is in conformity with Mourad *et al.* (1991). Similarly, effectiveness of spinosad, indoxacarb in reducing locule damage is in agreement with Anonymous (2000) and Lavekar (2001) found that the treatments, lamb da-cyhalothrin 5 EC @ 15 g a.i/ha and profenofos 50 EC @ 750 g a.i/ha recorded highest seed cotton yield.

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REFERENCES

Anonymous (2000). Report of Principal Investgator in Entomology Research during 1999-2000 in Central zone presented at the annual meeting of AICCIP, held at Acharya N.G Ranga Agril. Univ. Hyderabad pp. 78-83.

Atwal, A.S. (1986). Agricultural pests of India and South East Asia. 2nd Edn. Kalyani Publishers, New Delhi.

Brickle, D.S., Turnipseed, S.G., Sullivvan, M.J., Dugger P. and Richer, D. (1999). The efficacy of different insecticides and rates against cotton bollwarm (Lepidoptera : Noctuidae) in Bt. and conventional cotton. Cotton conf. Flrida, USA. 934-936.

Dandale, H.G., Rao, N.G.V., Tikar, S.N and Nimbalkar, S.A. (2000). Efficacy of spinosad against cotton bollwarm in comparison with some synthetic pyrethroids. *Petrology*, **24 (11) :** 6-10.

Dhonde, S.V. (2003). Testing of newer insecticide along with bioregions against *Helicoverpa armigera* (Hub), Hardwick in chickpea. M.Sc (Ag.) Thesis, Dr. P.D.K.V., Akola.

Joshi, U.K., Kundalkar, D.G. and Bhalerao, S.S. (1967). Study of boll shedding of G-46 cotton (II). College of Agril. Magazine, Parbhani, **9** : 21.

Johnson, D.R., Meyers, H.B., Page, L.M., Singer, T. L. (1997). Comparison of new insecticides for the control of bollwarm and tobacco bollwarm in Arkansas. Special report Agricultural Experiment station , Division of Agriculture, Univ. of Arkansas. **183** : 191-193.

Lavekar, R.C. (2001). Bio-efficacy of lambda-cyhalothrin 5 EC against sucking pest and bollwarm complex of cotton. Agresco report submitted to M.A.U Parbhani, by Pesticide Res. Center, Parbhani (M.S.). pp 25-30.

Mourad, M.A., Omer, M.E and Mahran, A.A. (1991). Field potency of different insecticides against cotton bollwarm. *Egyptian J. Agri. Res.*, **69 (1) :** 57-62.

Sohi, G.S. (1964). *Pests of cotton Entomology in India* published by Entomological society of India, New Delhi, pp. 112-148.

Veeresh, G.K. (1980). Economic losses to pests of major crops in India. In " *Assessment of crop losses due to pest and diseases* Ed.". Govinda, H.C., Veeresh, G.K., Walker, P.T and Jenkyn, J.F. Univ. Agric. Sci. Hebbal, Bangalore, pp. 31-48.

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