The Pharma Innovation Journal 2022; 11(9): 981-983

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(9): 981-983

www.thepharmajournal.com
Received: 15-07-2022
Accepted: 22-08-2022

VB Berad
M.Sc. Student, Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

GP Harke
M.Sc. Student, Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

PR Zanwar
Associate Professor, Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Corresponding Author:
VB Berad
M.Sc. Student, Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Efficacy of ready-mix insecticide formulations against bollworm complex in cotton

VB Berad, GP Harke and PR Zanwar

Abstract
A field experiment was conducted at the experimental farm of Department of Agricultural Entomology, VNMKV, Parbhani during *Kharif*-2019, in randomized block design with nine treatments including untreated control, replicated thrice on cotton variety NH-615 sown at 60 cm × 30 cm spacing. Chlorantraniliprole 8.8% + Thiamethoxam 17.5% SC, Spinetorum 10% + Sulfoxaflor 30% WG, Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC were found significant treatments in reducing fruiting body as well as locule damage. These treatments were also recorded highest seed cotton yield in comparison with other treatments.

Keywords: Ready-mix insecticide formulation, cotton, fruiting damage, locule damage

Introduction
Cotton is an important industrial crop of the world and it is the livelihood for about 60 million Indians including farming, textile and trade sectors. The area covered under cotton in India, during 2019-20 was 12.5 million hectares and production of 354 lakh bales as compared to world average of 11 million bales (Anonymous, 2018) [1].
The crop is attacked by 1326 species of insect pests throughout the world. In India 160 species of insect pests have been reported to attack cotton crop right from time of germination till final harvesting of cotton of which sucking pest and bollworm complex consisting of three notorious bollworm: Pink bollworm (*Pectinophora gossypiella*), Spotted bollworm (*Earias vitella*) and American bollworm (*Helicoverpa armigera*) are considered to be of great menace.
Cotton growers in India depend heavily on synthetic pesticides to combat sucking pests. Due to continuous and indiscriminate use of synthetic insecticides, there is resistance and hence efficacy has become less reliable (Kranthi *et al*., 2001 and Regupathy *et al*., 2004) [5, 10]. At certain interval, we may observe the outbreak of some of pests. The outbreak of pink bollworm on cotton in India during 2017 caused heavy economic damage. Novel molecules are effective at low doses and have less exposure in environment. Therefore, the present study was conducted to evaluate efficacy of ready-mix insecticide formulations on bollworm complex. NH-615, a high yielding cultivar of American cotton was selected for the evaluation, due to its morphological features and tolerance to sucking pests, bacterial blight, Alternaria and grey mildew diseases.

Materials and Methods
The experiment was conducted at the Research Farm of Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, (MS) during *Kharif* 2019-20. The experiment was laid out in Randomized Block Design (RBD) with three replications and eight treatments along with untreated control. The plot size of each treatment was 5.4×2.7 m. The cotton variety NH-615 was sown at 60 x 30 cm spacing in 5.4× 2.7 m plot size. The observations on fruiting body damage were recorded at 7 and 14 days after each spray from five randomly selected plants of each plot. The locule damage and seed cotton yield were also recorded. The data obtained was subjected to suitable statistical analysis to draw relevant conclusion.

Effect of ready-mix insecticide formulations against bollworm complex damage in fruiting bodies
The observation of infested squares, flowers, buds, bolls from each of observation plant from seven and fourteen days after each spraying was taken.

$$\% \text{ damage in fruiting bodies} = \frac{\text{Damaged fruiting bodies}}{\text{Total fruiting bodies}} \times 100$$

Effect of read-mix insecticide formulations on locule damage

Before the commencement of each picking, bolls were sampled randomly from each plot. Then the total number of locules and damaged locules were counted and expressed in terms of locule damage, as below.

$$\text{Locule damage (\%)} = \frac{\text{Total number of damaged locules}}{\text{Total number of locule}} \times 100$$

Effect of ready-mix insecticide formulations on yield of seed cotton

In three pickings, all seed cotton was collected after full bursting of bolls. Total yield of seed cotton obtained from each treated net plot was recorded separately and converted to q/ha.

Statistical analysis

The figures obtained from evaluation of read-mix insecticide formulations against bollworm complex in fruiting body damage, locule damage and yield were analyzed for one variable factor and subjected to arc sign transformation.

Results and Discussion

Effect of ready-mix insecticide formulations against bollworm complex damage in fruiting bodies

The observations recorded 7 days and 14 days after each spraying (first spray, second spray and third spray) showed significant treatment differences in per cent fruiting body damage due to bollworm complex.

The overall results data (Table 1) indicated that the treatments with Chlorantraniliprole 8.8% + Thiamethoxam 17.5% SC were observed superior and effective treatments in reducing the percent fruiting body damage (5.09%). Spinetorum 10% + Sulfoxaflor 30% WG (5.6%) and Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC (6.79%) these treatments were at par with each other, However next effective treatments for lowering the fruiting body damage were Thiamethoxam 12.6% + Lambda cyhalothrin 5% ZC (7.37%), Indoxacarb 14.5% + Acetamiprid 7.7% SC (7.86%), Novaluron 5.25% + Indoxacarb 4.5% SC (8.11%), Profenophos 40% + Cypermethrin 4% EC (8.14%) and these treatments were also found at par with each other. The highest fruiting body damage was observed in plots of untreated control (24.23%).

The spray of insecticide mixture has been reported to be more useful against bollworm complex on cotton by various workers *viz.*, Dandale and Kadam, 2003 [4]; Patil *et al*., 2004 [9]; Baheti *et al.*, 2015 [2] and Bhujade, 2018 [3].

Effect of ready-mix insecticide formulations on locule damage

The lowest loculi damage (15.38%) was observed in the plots sprayed with Chlorantraniliprole 8.8% + Thiamethoxam 17.5% SC followed by Spinetorum 10% + Sulfoxaflor 30% WG (18.66%) and these treatments were at par with each other. The next effective treatments in reducing the percent loculi damage were Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC (19.72%) and Thiamethoxam 12.6% + Lambda cyhalothrin 5% ZC (21.32%). The other treatments were also recorded minimum loculi damage in comparison with untreated control. However, the efficacy of chlorantranilipole 9.3% + lambda cyhalothrin 4.6% ZC support research work carried out by Bajya *et al.* (2015) [2] wherein they observed that Ampligo 150 ZC (combination of chlorantranilipole 9.3% + lambda cyhalothrin 4.6% ZC) was highly effective in reduction of percent damage to squares, bolls and locule during *Kharif* 2011 and 2013. Bhujade (2018) [3] noticed that application of chlorantraniliprole 8.8% + thiamethoxam 17.5% SC proved effective in reduction of locule damage, which was at par with indoxacarb 14.5% + acetamiprid 7.7% SC, chlorantraniliprole 9.3% + lambda cyhalothrin 4.6% ZC.

Table 1: Effect of ready-mix insecticide formulations against bollworm complex fruiting body damage

Tr. No	Treatment	Dose a.i/ha	First Spray			Second Spray		Third Spray		Mean
			PTC	7 DAS	14 DAS	7 DAS	14 DAS	7 DAS	14 DAS	
1	Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC	37.5 g	12.29 (20.52)	4.86 (12.73)	6.26 (14.48)	5.60 (13.68)	6.73 (15.03)	5.33 (13.34)	6.73 (14.72)	6.79 (15.10)
2	Profenophos 40% + Cypermethrin 4% EC	440 g	10.18 (18.6)	6.66 (14.95)	8.40 (16.84)	7.20 (15.56)	8.60 (17.05)	7.46 (15.85)	8.53 (16.98)	8.14 (16.57)
3	Cypermethrin 3% + Quinalphose 20% EC	230 g	12.30 (20.53)	9.60 (18.04)	10.60 (19.00)	10.73 (19.12)	11.40 (19.73)	11.06 (19.42)	11.86 (20.14)	11.07 (19.43)
4	Indoxacarb 14.5% + Acetamiprid 7.7% SC	88.8 g	13.87 (21.86)	5.73 (13.84)	7.26 (15.63)	6.34 (14.58)	7.60 (16.00)	7.00 (15.34)	7.26 (15.63)	7.86 (16.28)
5	Thiamethoxam 12.6% + Lambda cyhalothrin 5% ZC	44 g	11.96 (20.23)	5.26 (13.25)	6.60 (14.88)	6.20 (14.41)	7.53 (15.92)	6.93 (15.26)	7.13 (15.48)	7.37 (15.75)
6	Chlorantraniliprole 8.8% + Thiamethoxam 17.5% GR	150 g	11.57 (19.88)	3.73 (11.13)	5.46 (13.51)	4.86 (12.73)	5.73 (13.84)	4.86 (12.73)	5.93 (14.09)	5.09 (13.03)
7	Novaluron 5.25% + Indoxacarb 4.5% SC	43.31+37.13 g	11.67 (19.97)	6.60 (14.88)	7.40 (15.78)	7.00 (15.34)	8.40 (16.84)	7.26 (15.63)	8.46 (16.9)	8.11 (16.54)
8	Spinetorum 10% + Sulfoxaflor 30% WG	120 g	11.47 (19.79)	4.60 (12.38)	6.13 (14.33)	5.20 (13.18)	5.93 (14.09)	5.06 (12.99)	6.46 (15.03)	5.60 (13.68)
9	Untreated control	-	12.57 (20.76)	14.8 (22.62)	17.93 (25.05)	20.73 (27.08)	25.6 (30.39)	30.73 (33.66)	35.6 (36.63)	24.23 (29.48)
	SE ±		-	0.59	0.55	0.64	0.58	0.59	0.88	0.64
	CD @ 5%		NS	1.77	1.65	1.91	1.74	1.78	2.65	1.91
	CV%		-	14.91	11.33	13.51	10.38	10.82	14.08	12.50

* Figures in parentheses are angular transformed values. PTC: Pre-Treatment Count DAS – Days after Spraying

Table 2: Effect of ready-mix insecticide formulations on the locule damage and seed cottonyield

Tr. No.	Treatment	Dose a.i / ha	Conc.%	Locule damage (%)	Seed Cotton Yield (qt/ha)
T_1	Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC	37.5 g	0.006%	19.72 (26.36)	8.3 (16.80)
T_2	Profenophos 40% + Cypermethrin 4% EC	440 g	0.088%	25.17 (30.11)	6.8 (15.14)
T_3	Cypermethrin 3% + Quinalphose 20% EC	230 g	0.046%	28.57 (32.31)	6.4 (14.67)
T_4	Indoxacarb 14.5% + Acetamiprid 7.7% SC	88.8 g	0.046%	23.62 (29.07)	7.5 (15.92)
T_5	Thiamethoxam 12.6% + Lambda cyhalothrin 5% ZC	44 g	0.008%	21.32 (27.49)	7.9 (16.35)
T_6	Chlorantraniliprole 8.8% + Thiamethoxam 17.5% GR	150 g	0.026%	15.38 (23.08)	9.7 (18.14)
T_7	Novaluron 5.25% + Indoxacarb 4.5% SC	43.31+37.13 g	0.019%	24.36 (29.57)	7.1 (15.52)
T_8	Spinetorum 10% + Sulfoxaflor 30%WG	120 g	0.002%	18.66 (25.59)	8.7 (17.18)
T_9	Untreated control	-	-	38.76 (38.50)	3.8 (11.24)
	SE ±			1.24	0.38
	CD @ 5%			3.73	1.15
	CV%			9.00	9.06

* Figures in parentheses are angular transformed values.

Effect of ready-mix insecticide formulations on seed cotton yield

All the insecticides were found to be significantly superior in recording higher seed cotton yield over untreated control (Table 2). The highest yield of seed cotton (9.7q/ha) was obtained from the plots treated with Chlorantraniliprole 8.8% + Thiamethoxam 17.5% SC and Spinetorum 10% + Sulfoxaflor 30% WG (8.73 q/ha) which were at par with each other. Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC (8.36 q/ha), Thiamethoxam 12.6% + Lambda cyhalothrin 5% ZC (7.93 q/ha), Novaluron 5.25% + Indoxacarb 4.5% SC (7.16 q/ha), Profenophos 40% + Cypermethrin 4% EC (6.83 q/ha) and Cypermethrin 3% + Quinalphose 20% EC (6.42 q/ha) were also recorded more seed cotton yield. However, in untreated control plot, the lowest seed cotton yield (3.8 q/ha) was recorded. The present findings are more or less parallel to Naveed *et al.* (2015) [6] revealed that Thiamethoxam+Chlorantraniliprole gave high cotton yield over untreated plot. Bajya *et al.* (2015) [2] reported that the combination of chlorantranilipole 9.3% + lambdacyhalothrin 4.6% ZC) in cotton gave higher yield during *Kharif* 2011 and 2013.

The other treatments were also recorded higher seed cotton yield as compared to untreated control plot. From the present studies it could be concluded that the ready-mix insecticide formulations Chlorantraniliprole 8.8% + Thiamethoxam 17.5% SC, Spinetorum 10% + Sulfoxaflor 30% WG (5.6%) and Chlorantraniliprole 9.3% + Lambda cyhalothrin 4.6% ZC (6.79%) were found to be most effective treatments in reducing fruiting body damage, locule damage as well as recording highest seed cotton yield.

References

1. Anonymous. Annual report of cotton-corporation of India; 2018. p. 10-32.
2. Baheti HS, Bajya DR, Raza SK. Field efficacy of newer Insecticide formulation Ampligo 150 ZC against bollworm complex in cotton. J Cotton Res. Dev. 2015;29(1):94-98.
3. Bhujade DR, Zanwar PR, Bokan SC. Evaluation of Newer Insecticide Combinations against Bollworm Complex in Cotton. Int. J Curr. Microbiol. App. Sci. 2018;7(7):3619-3626.
4. Dandale HG, Pradyna Kadam. Role of new insecticide molecule in the management of cotton bollworms. State level seminar on pest management for Sustainable Agriculture, MAU, Parbhani, 2003.
5. Kranthi KR, Naidu S, Dhawad CS, Tatwawadi A, Mate K, Patil E, *et al*. Temporal and intra-plant variability of Cry1Ac expression in Bt-cotton and its influence (Hubner) (Noctuidae: Lepidoptera). Current science, 2005, 291-298.
6. Naveed Haider, Kanwer Shahzad Ahmed, Azhar Abbas Haidary, Muhammad Afzal, Muhammad Zeeshan Majeed. Field evaluation of different insecticides against spotted bollworm (Earias spp.) and comparative yield assessment for BT and non-Bt cotton. Journal of Entomology and Zoology Studies. 2015;4(1):33-35.
7. Patel BH, Patel DM, Patel MJ, Patel JR. Bioefficacy of various readymix synthetic insecticides against pest complex of cotton. Indian J Agric. Sci. 1988;68(12):780-781.
8. Patil BV, Bheemanna M, Thulsiram K, Hugar PS. Bioefficacy of Polytrin-C 44EC on cotton insect pests. Pestology. 1994;18(10):52-59.
9. Patil SS, Nemade PW, Siddhabatti PM, Wadaskar RM. Comparative efficacy of representative insecticides against cotton bollworm, *H. armigera* (Noctuidae: Lepidoptera). Pestology. 2004;28:32-36.
10. Regupathy A, Ramasubramanian T, Ayyasamy R. Rationale behind the use of insecticide mixtures for the management of insecticide resistance in India. Food, Agriculture & Environment. 2004;2(2):278-284.