



Alternation of insecticide sprays for the management of the bollworms and effect of natural Enemies pest of BT cotton

Bhavna Verma¹, Girish Patidar² Ravikant Soni³ and Sachin Patidar⁴

¹ Technical Officer at Directorate of Plant Protection Quarantine & Storage, CIPMC Indore, Madhya Pradesh, India

² Assistant Professor at Medi- Caps University Indore, Madhya Pradesh, India

³⁻⁴ Ph. D. Research Scholar at Dr. B. R. Ambedkar University of Social Sciences, Mhow Indore, Madhya Pradesh, India

Abstract

An experiment was conducted during *kharif* 2014 at College of Agriculture, Indore (M.P.) All India Coordinated Cotton Improvement Project Indore (M.P.). In randomized block design. The least open boll damage was recorded in T3- Imidacloprid (17.8%SL) @ 25 *gai/ha* & Acephate (75%SP) @ 250 *gai/ha*. (2.66%). further locule damage per cent was noticed minimum in T4- thiamethaxam WG @ 37.5 *gai/ha* and Imidacloprid 30.5 SC @ 26.25 *gai/ha* (3.56%). The highest seed cotton yield was observed in T7- Acetamiprid (20%SP) @ 30 *gai/ha* & Difenthiuran (50%WP) @ 300 *gai/ha*. Received maximum net return (Rs.121313) with maximum cost benefit ratio (1:2:81) at par with T6- Fipronil (5%SC) @ 100 *gai/ha* & Lambdacyhalothrin (4.9%EC) @ 15 *gai/ha*. In which (3105kg/ha) yield was recorded and second highest net return (112092) and cost benefit ratio (1:2.60) was noticed.

Keywords: insecticides, natural enemies, bollworms, crop, *BT* cotton

Introduction

Cotton (*Gossypium* sp.) is an important *Kharif* cash and fibre crop of India. Cotton is known as the “white gold”. Belongs to family *Malvaceae*. The new world cotton *viz.*, *G. hirsutum* (L.) Cultivated in about 60 countries in the world. With the production of cotton is 29.59 million bales. In India, cotton is grown in almost all parts of the country but it is produced mostly in the black soil areas and also to a considerable extent in the upper part of the Indo-Gangetic alluvium. In Madhya Pradesh cotton is mainly grown in Nimar and Malwa Plateau, besides being the main source of raw material for textile industry in the country, it also provides cotton seeds of high industrial value. Important insect pests of cotton crop are bollworm complex and sucking pests. Among the sucking pests, aphid (*Aphis gossypii* Glover), leafhopper (*Amrasca biguttula biguttula* Ishida), thrips (*Scirtothrips dorsalis* Hood) and whitefly (*Bemisia tabaci* Gennadius) attack at the early stage of the crop, while bollworms *viz.*, spotted bollworm (*Earias vittella* Fabricius and *Earias insulana* Boisduval), American bollworm (*Helicoverpa armigera* Hubner) and pink bollworm (*Pectinophora gossypiella* Saunders) are the most serious pests during the fruiting stage of the crop. The continuous cultivation of *Bt* cotton reduces the infestation of boll worms and increases the activities of sucking pests. It is also in tradition that a numbers of sprays of various insecticides are required to control pests. the continuous and repeated application of various insecticides has created many fold resistance against insecticides (Singh & Jaglan, 2005 and Sayyed *et al.* 2011) To avoid the resistance against pesticides, repeated spray of same insecticide is not recommended and insecticides should always be used alternatively viewing the above facts the present study is planned to use two insecticides alternatively in one treatment.

Material and Methods

Table 1: Experimental detail

Experimental detail	
Crop	Cotton <i>Bt.</i>
Hybrid	NCS 927
Design	RBD (Randomized Block Design)
Replications	3
Treatments	8
Plots	24
Gross plot size	2.4 x 2.4 = 5.76 m ²
Net plot size	1.8 x 1.8 = 3.24 m ²
Spacing	0.6 x 0.6 m ²
Spacing replication	1.0 m
Spacing plots	1.0 m

Results and Discussion

Incidence of bollworm complex

1.1 Efficacy of insecticides against bollworm complex.

The least open boll damage per cent was recorded in T3- Imidacloprid 17.8 SL @ 25 *gai/ha* and Acephate 75 SP @ 250 *gai/ha* (2.66%) and exhibited non-significant difference within T6- Fipronil 5 SC @ 100 *gai/ha* and Lambdacyhalothrin 4.9 EC @ 15 *gai/ha* (2.85), T1- Imidacloprid 70 WG @ 24.5 *gai/ha* & OxydmetonMethyl 25 EC @ 250 *gai/ha* (2.93), T2- Thiachlorprid 21.7 SC @ 30 *gai/ha* and Dimethoate 30 EC @ 250 *gai/ha* (3.26%), T4- thiamethaxam 25 WG @ 37.5 *gai/ha* and Imidacloprid 30.5 SC @ 26.25 *gai/ha*, (3.32%). further locule damage per cent was noticed minimum in T4- thiamethaxam WG @ 37.5 *gai/ha* and Imidacloprid 30.5 SC @ 26.25 *gai/ha* (3.56%) and found at par with T6- Fipronil 5 SC @ 100 *gai/ha* and Lambdacyhalothrin 4.9 EC @ 15 *gai/ha* (3.74%) and T3-

Imidacloprid 17.8 SL @ 25 gai/ha and Acephate 75 SP @ 250 gai/ha (3.99%), T2 Thichlorprid 21.7 SC @ 30 gai/ha and Dimethoate 30 EC @ 250 gai/ha (4.22) and T5 Spiromesifen 22.9 SC @ 144 gai/ha and Deltamethrin 2.8 EC @ 15 gai/ha, (4.36). The present finding supported by Prasad and Rao (2008), Kumar *et al.* and (2012) Naik *et al.* (2013).

Conclusion

1.2 Seed cotton yield and economics.

The highest seed cotton yield was observed in T7 (3264) and it was at par with T6 (3105) and followed with T4 (2884), T1

(2441), T5 (2416), T2 (2060) and T3 (1779). The minimum seed cotton yield was recorded in untreated check T8 (1325). Patil *et al.* (2009) significantly highest seed cotton yield was harvested with higher dosage of fipronil 5% SC @ 800 g/ha which was on par with acetamiprid 20 SP@ 100 g/ha.

Based on over all expenditure and gain of treatments maximum cost benefit ratio was noted in T7 (1:2.81) followed by T6 (1:2.60), T4 (1:2.55), T1 (1:2.08), T5 (1:1.89), T2 1:1.66), T3 (1:1.40).

Table 2: Damage by bollworm complex and seed cotton yield.

Treatments	Dosage	Damage by bollworm complex		Seed cotton yield (Kg/ha)
	g.a.i./ha	Open boll damage%	Locule damage %	
T1-	24.5 and 250	2.93 (9.86)	4.66 (12.47)	2441
T2-	30.0 and 250	3.26 (10.40)	4.22 (11.85)	2060
T3-	25.0 and 250	3.78 (11.21)	3.99 (11.52)	1779
T4-	26.25 and 37.5	3.32 (10.50)	4.36 (12.05)	2884
T5-	144 and 15.0	2.66 (9.39)	3.56 (10.88)	2416
T6-	100 and 15.0	2.85 (9.72)	3.74 (11.15)	3105
T7-	30.0 and 300	3.95 (11.46)	4.45 (12.18)	3264
T8-	–	4.63 (12.43)	5.48 (13.54)	1325
S Em±		(0.36)	(0.47)	(10.81)
CD at 5 %		(1.03)	(1.33)	(32.49)
CV %		6.03	6.97	146.64

The values in parentheses are square root transformed values.
DAS = Days after spray.

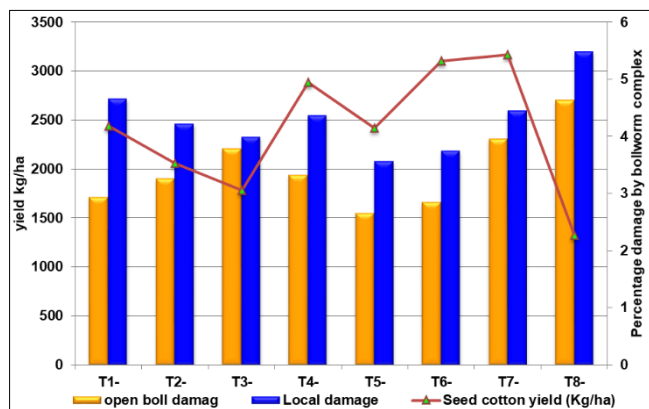


Fig 1: Damage by bollworm complex and seed cotton yield.

2.1 Adverse effect of Insecticides against Natural Enemies.

The total number of natural enemies viz chrysoids, coccinellids and spiders were observed collectivity on five randomly selected plants from each plot before 1st spray and 10 days after each spray. The population of natural enemies was found in the range of 16.95 to 21.18 per five plants and exhibited non-significant difference in all the treatments including untreated check. Similarly it also differed non-significantly in the last observation of each spray although slight population fluctuation was noted in each treatment. During the significant in the present investigations of insecticidal in of treatments was observed against natural enemies. Sharma *et al.* (2008), Fonseca *et al.* (2008), Patel *et al.* (2010) and Sohrabi *et al.* (2012)

Table 3: Effect of treatments on natural enemies.

Treatments	Dosage g.a.i./ha	Pre- treatment	Natural Enemies(Coccinellid,chrysopids and spiders) /five plants					
			1 st spray 10 DAS	2 nd spray 10 DAS	3 rd spray 10 DAS	4 th spray 10 DAS	5 th spray 10 DAS	6 th spray 10 DAS
		T1-	24.5 and 250	17.52 (4.2)	17.64 (4.3)	18.34 (4.3)	21.22 (4.7)	19.21 (4.4)

T2-	30.0 and 250	16.95	18.44	14.67	17.11	15.72	14.67	13.44
		(4.2)	(4.4)	(3.9)	(4.2)	(4.0)	(3.9)	(3.7)
T3-	25.0 and 250	18.12	16.29	19.27	13.21	21.06	19.27	17.34
		(4.3)	(4.1)	(4.4)	(3.7)	(4.6)	(4.4)	(4.2)
T4-	26.25 and 37.5	18.37	18.1	15.19	17.82	16.13	15.19	18.64
		(4.3)	(4.3)	(4.0)	(4.3)	(4.1)	(4.0)	(4.4)
T5-	144 and 15.0	17.62	19.64	14.39	20.74	16.54	14.39	21.13
		(4.3)	(4.5)	(3.9)	(4.6)	(4.1)	(3.9)	(4.7)
T6-	100 and 15.0	19.12	19.21	17.31	17.35	15.78	17.64	21.91
		(4.4)	(4.4)	(4.2)	(4.2)	(4.0)	(4.3)	(4.7)
T7-	30.0 and 300	21.18	20.68	18.81	16.89	19.31	18.44	19.74
		(4.7)	(4.6)	(4.4)	(4.2)	(4.5)	(4.4)	(4.5)
T8-	---	18.14	17.55	15.96	18.37	19.27	16.89	20.62
		(4.3)	(4.2)	(4.1)	(4.3)	(4.4)	(4.2)	(4.6)
S Em±		NS	NS	NS	NS	NS	NS	NS
CD at 5 %		NS	NS	NS	NS	NS	NS	NS
CV %		NS	NS	NS	NS	NS	NS	NS

The values in parentheses are square root transformed values.
DAS = Days after spray

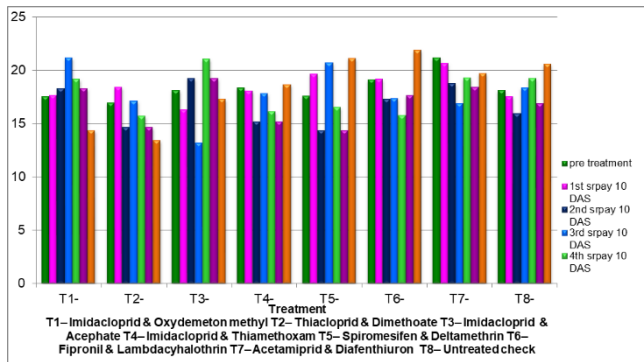


Fig 2: Effect of treatments on natural enemies.

4. Acknowledgements

The research findings are the part of the research work of PG Programme of the first author to be submitted to the Department of Entomology, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, College of Agriculture Indore (M.P.) We are very grateful to Dr.R.K. Choudhary (Associate Professor at College of Agriculture Indore) and Dr. Manorama sharma (Associate Professor at College of Agriculture Indore) to have helped a lot in the research work, field monitoring and data collection.

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