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Evaluation of Newer Molecules of Insecticides Against Sucking Pests complex Infesting Okra

KEYWORDS: okra, sucking pests, Newer Molecules of Insecticides,

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ABSTRACT *The studies on the efficacy of newer insecticides as foliar revealed that imidacloprid 17.8 SL @ 40 g a.i./ha was the most effective treatment indicating reduction in population of leafhoppers, aphids, whiteflies and thrips was 89.9, 93.1 , 91.0 and 90.65 per cent , respectively and recorded maximum fruit yield of 52.2 q/ha with 97.72 per cent increase in fruit yield over untreated control. It was followed by imidacloprid 17.8 SL @ 15 g a.i./ha, thiamethoxam 25 WG, acetamiprid 20 SP and fipronil 5 % SC.*

All the treatments, except spinosad 45 SC were effective in controlling sucking pest population in okra and all the treatments were observed to be significantly superior over untreated control.

INTRODUCTION

Among the constraints for low production in okra, the damage caused by pests is important one. Many of the pests occurring on cotton are found to ravage okra crop as it belongs to same family. As many as 72 species of insects have been recorded on okra (Srinivas Rao and Rajendran,2003) , of which , the sucking pests comprising of aphids (*Aphis gossypii* Glover), leafhopper (*Amrasca biguttula biguttula* Ishida), whitefly (*Bemisia tabaci* Gennadius) and thrips (*Thrips tabaci* Linderman) cause significant damage to the crop.

Aphids and leafhoppers are important pests in the early stage of the crop which desap the plants, make them weak and reduce the yield. Failure to control them in the initial stages was reported to cause an yield loss to the tune of 54.04 per cent (Chaudhary and Dadeech,1989). Whitefly besides causing direct damage, acts as a vector of yellow vein mosaic virus (YVMV), which is a major constraint for okra cultivation (Neeraja, *et al.*2004).

The use of conventional pesticides for the management of sucking pests has mainly attributed for the rapid population build up of these pests. The augmented problems associated with modern agriculture, the management of sucking pests was experienced to be difficult with the existing organophosphorus compounds, upon which long reliance was shown by farming community.

MATERIAL AND METHODS

Beds of ridges and furrows of 4×3 mt size were prepared and two seeds at one place were dibbled at 20-25mm depth, following 30×15 cms spacing. After seven days of sowing thinning and gap filling was done and at one spot one plant was maintained. The recommended fertilizer dose 100:50:50 (N:P:K) Kg/ha was given.

The experiment was conducted in Randomized block design with eight treatment and three replication. Two insecticidal sprays were applied with the help of manually operated knapsack sprayer. The quantity of spray fluid required for treating the crop per plot was calculated by spraying untreated control plot with water.

Observations on the number of aphids, nymphs of jassids, thrips and whiteflies were recorded on five randomly selected plants per plot. Number of insects were recorded from three leaves of each randomly selected plants, one upper, one middle and one bottom canopy of the plant. The population of sucking pests before spraying as pre-count and on second, seventh and fifteen days after each spray was recorded in the early morning hours. Spray schedule of insecticides commenced on 15and 30 days after sowing. The weight of healthy fruits during each picking was recorded from each net plot. The treatment-wise total yield was calculated by summation of the yield obtained from each picking. The yield data was expressed as quintal/ha.

RESULTS AND DISCUSSION

The data on the efficacy of various treatments in reducing leafhopper, aphids, white flies and thrips population are furnished in the Table.1

Leafhopper:

The overall mean population of leafhoppers of two sprays were calculated and results showed that imidacloprid 17.8 SL @ 40 g a.i./ha proved to be effective and superior over rest of the treatments and recorded minimum population of leafhoppers (2.47 leafhoppers/3 leaves). The next best treatments were imidacioprid17.8 SL @ 15 g a.i./ha (3.58 leafhoppers/3 leaves) and thiamethoxam 25 WG (3.83 leafhoppers/3 leaves) which were at par with each other. Where as the treatments acetamaprid 20 SP (4.72 leafhoppers/3 leaves), fipronil 5% SC (5.17 leafhoppers/3 leaves), bifenthrin 10 EC (5.71 leafhoppers/3 leaves) were found at par with one another. Spinosad 45 SC recorded 6.32 leafhoppers/3 leaves as compared to 23.45 leafhoppers/3 leaves in untreated control.

The superiority of imidacloprid 17.8 SL @ 40 g a.i./ha was in close agreement with Bagade and Ambekar (2009) who reported that four sprays of imidacloprid (0.004 %) was found to be effective and registered 5.15 jassids/plant. As reported by Misra and Senapati (2003) thiamethoxam 25 WG @ 25 g a.i./ ha and imidacloprid @ 25 g a.i./ha gave significant excellent control of okra jassids. These results are agreement with Patil *et al*.(2004) and Suman Gupta *et al*.(2009).

Aphids (*Aphis gosssypii*)

The mean population of aphids of two sprays was calculatedand results indicatyed that imidacloprid 17.8 SL @ 40 g a.i./ha proved to be effective and superior over rest of the treatments and recorded the lowest population of aphids (1.41 aphids/3 leaves). The next best treatments were imidacloprid 17.8 SL @ 15 g a.i./ha (2.53 aphids/3 leaves) and thiamethoxam 25 WG (3.15 aphids/3 leaves) which were at par with each other. Whereas, the treatments acetamiprid 20 SP (3.86 aphids/3 leaves), fipronil 5%SC (3.9 aphids/3 leaves), bifenthrin 10 EC (4.45 aphids/3 leaves) were found at par with each other. Spinosad 45 SC recorded 5.59 aphids/3 leaves as compared to 20.41 aphids /3 leaves in untreated control.

The findings of present investigations were in line with Gosalwad *et al*. (2008) who recorded significantly lower population of aphids (0.16-1.86 aphids/3 leaves)in treatment with imidacloprid 17.8 SL @ 40 g a.i./ha. The efficacy of bifenthrin 10 EC was in line with Chinniah *et al* (2000) who reported that bifenthrin 10 WP (0.015%) was effective in controlling okra aphid.

Whitefly (*Bemisia tabaci*)

The mean population of whiteflies of two sprays was calculated, results indicated that imidacoprid 17.8 SL @ 40 g a.i./ha proved to be effective and significantly superior over rest of the treatments and recorded minimum population of whiteflies (1.69 whiteflies/3 leaves). The next best treatments were imidacloprid 17.8 SL@15 g a.i./ha (2.7 whiteflies/3 leaves) and thiamethoxam 25 WG (2.97 whiteflies/3 leaves) which were at par with each other. Whereas, the treatments acetamiprid 20 SP (3.88 whiteflies/3 leaves), fipronil 5% SC (3.98 whiteflies/3 leaves), bifenthrin 10 EC (4.9 whiteflies/3 leaves) were found at par with one another . Spinosad 45 SC recorded 5.72 whiteflies /3 leaves as compared 18.83 whiteflies/3 leaves in untreated control.

The present findings were in close agreement with Day *et al*. (2005) and Raghuram and Gupta (2005) they reported that imidacloprid 200 SL provided excellent control of whiteflies up to 15 days after spraying. Kale *et al*. (2005) indicated that thiamethoxam 25 WG followed by alphamethrin 0.05 % spray was the most effective treatment in reducing whitefly population in okra. The effective control of whiteflies with foliar application of acetamiprid was also documented by Horowitz *et al*. (1998).

Thrips (*Thrips tabaci*)

The mean population of thrips of two sprays was calculated, results showed that imidacloprid 17.8 SL @ 40 g a.i./ha proved to be effective and superior over rest of the treatments and recorded the lowest population of thrips (1. 41 thrips/3 leaves). The next best treatments were imidacloprid 17.8 SL @ 15 g a.i./ha (2.23 thrips/3 leaves) and thiamethoxam 25 WG (2.52 thrips/3 leaves) which were at par with each other. Whereas, the treatments acetamiprid 20 SP (3.6 thrips/3 leaves), fipronil 5%SC (4.18 thrips/3 leaves) and bifenthrin 10 EC (4.85 thrips/3 leaves) were found statistically at par with each other. Spinosad 45 SC recorded 5.83 thrips/3 leaves as compared to 14.97 thrips /3 leaves in untreated control.

The present findings on new insecticides against thrips are in line with Pawar *et al*. (2003) who recorded higher efficacy of imidacloprid, acetamiprid against cotton thrips. Further, the effectiveness of imidacloprid against thrips is in line with that of Patil *et al*. (2002) against chilli thrips. The efficacy of bifenthrin 10 EC (1000 ml/ha) against thrips in okra was documented by Balakrishna *et al*. (2009) .

All the insecticidal treatments recorded significantly higher yield of okra as compared to untreated control. Among the treatments , imidacloprid 17.8 SL @ 40 ga.i./ha recorded significantly higher yield (52.2 q/ha) as compared to all other insecticidal treatments. The treatment with imidacloprid 17.8 SL @ 15 g a.i./ha , thiamethoxam 25 WG and acetamiprid 20 SP were the next in the order of yield. Significant differences did not exist among rest of the treatments.

Table 1: Efficacy of newer insecticides as foliar sprays against leafhoppers in okra (No. of leafhoppers/3 leaves)

Sr. No.	Insecticides	Dose /ha	Precount	First spraying 2 DAS	7 DAS	15DAS	Second spraying 2 DAS	7 DAS	15 DAS	Overall mean	% reduction over UTC
1.	Imidacloprid 17.8 SL	15 g	20.74	4.83	2.35	5.06	4.29	2.7	2.25	3.58	85.2 %
			(4.61)	(2.31)	(1.69)	(2.36)	(2.3)	(1.79)	(1.66)	(2.01)	
2.	Imidacloprid 17.8 SL	40 g	19.36	2.28	1.51	3.7	3.69	2.14	1.56	2.47	89.8 %
			(4.45)	(1.67)	(1.42)	(2.05)	(2.04)	(1.61)	(1.43)	(1.72)	
3.	Acetamiprid 20 SP	20 g	18.73	4.79	3.99	6.52	6.05	3.91	3.11	4.72	80.5 %
			(4.38)	(2.35)	(2.12)	(2.65)	(2.56)	(2.1)	(1.9)	(2.28)	

4.	Fipronil 5 % SC	15 g	18.79	6.0	2.88	7.0	6.41	4.88	3.42	5.17	78.6 %
			(4.39)	(2.55)	(1.84)	(2.74)	(2.63)	(2.32)	(1.98)	(2.38)	
5.	Spinosad 45 SC	250ml	17.98	6.57	5.75	7.91	7.5	5.55	4.34	6.32	73.8 %
			(4.29)	(2.66)	(2.5)	(2.9)	(2.83)	(2.46)	(2.2)	(2.61)	
6.	Thiamethoxam 25 WG	250 g	19.15	3.91	2.7	6.05	4.97	2.88	2.35	3.83	84.2 %
			(4.43)	(2.1)	(1.79)	(2.56)	(2.34)	(1.84)	(1.69)	(2.08)	
7.	Bifenthrin 10 EC	500ml	16.85	6.05	4.69	7.34	7.1	5.26	3.91	5.7	76.4 %
			(4.16)	(2.56)	(2.28)	(2.8)	(2.76)	(2.4)	(2.1)	(2.49)	
8.	Untreated control	--	18.43	19.12	21.11	22.3	26.5	27.1	28.6	24.1	-
			(4.16)	(4.42)	(4.64)	(4.77)	(5.19)	(5.25)	(5.39)	(4.96)	
	S.E.		N.S.	0.08	0.07	0.09	0.08	0.07	0.06	-	-
	C.D. @ 5%		N.S.	0.25	0.23	0.27	0.24	0.23	0.21	0.23	-

DAS – Days after spraying
Figures in parentheses are square root of (X+0.5) transformed values.

Table 2: Efficacy of newer insecticides as foliar sprays against aphids in okra (No.of aphids/3 leaves)

Sr. No.	Insecticides	Dose /ha	Precount	First spraying 2 DAS	First spraying 7 DAS	First spraying 15DAS	Second spraying 2 DAS	Second spraying 7 DAS	Second spraying 15 DAS	Overall mean	% reduction over UTC
1.	Imidacloprid 17.8 SL	15 g	11.57	2.75	2.45	2.89	2.77	2.35	2.02	2.53	87.6 %
			(3.47)	(1.8)	(1.7)	(1.84)	(1.81)	(1.69)	(1.59)	(1.74)	
2.	Imidacloprid 17.8 SL	40 g	12.66	1.47	1.39	1.59	1.42	1.34	1.29	1.41	93.1 %
			(3.62)	(1.4)	(1.37)	(1.4)	(1.38)	(1.35)	(1.33)	(1.38)	
3.	Acetamiprid 20 SP	20 g	11.56	5.5	3.54	5.21	3.78	2.66	2.52	3.86	81.0 %
			(3.47)	(2.45)	(2.0)	(2.39)	(2.06)	(1.78)	(1.74)	(2.08)	
4.	Fipronil 5 % SC	15 g	11.37	4.56	4.51	3.99	4.85	2.39	2.95	3.89	80.95 %
			(3.44)	(2.2)	(2.24)	(2.12)	(2.31)	(1.7)	(1.86)	(2.09)	
5.	Spinosad 45 SC	250ml	12.78	6.8	6.26	7.22	6.1	3.95	3.18	5.35	73.79 %
			(3.64)	(2.71)	(2.6)	(2.78)	(2.57)	(2.11)	(1.92)	(2.41)	
6.	Thiamethoxam 25 WG	250 g	11.33	3.5	3.14	3.86	3.74	2.18	2.49	3.15	84.6 %
			(3.43)	(2.0)	(1.91)	(2.09)	(2.06)	(1.64)	(1.73)	(1.91)	
7.	Bifenthrin 10 EC	500ml	11.66	6.0	4.6	5.3	4.69	2.74	2.99	4.62	77.4 %
			(3.48)	(2.55)	(2.26)	(2.41)	(2.28)	(1.81)	(1.87)	(2.26)	
8.	Untreated control	--	11.14	16.96	17.23	17.5	24.6	23.6	22.7	20.41	-
			(3.41)	(4.17)	(4.21)	(4.24)	(5.0)	(4.9)	(4.81)	(4.57)	
	S.E.		N.S.	0.07	0.11	0.12	0.14	0.09	0.08	-	-
	C.D. @ 5%		N.S.	0.22	0.31	0.35	0.41	0.28	0.24	0.3	-

Figures in parentheses are square root of (X+0.5) transformed values.

Table 3: Efficacy of newer insecticides as foliar sprays against whiteflies in okra (No. of whiteflies/ 3 /leaves)

Sr. No.	Insecticides	Dose / ha		First spraying			Second spraying			Overall mean	% reduction over UTC
			Precount	2 DAS	7 DAS	15 DAS	2 DAS	7DAS	15 DAS		
1.	Imidacloprid	15 g	11.57	2.59	2.06	4.34	3.07	2.18	2.02	2.7	85.6 %
	17.8 SL		(3.47	(1.76)	(1.6)	(2.2)	(1.89)	(1.64)	(1.59)	(1.79)	
2.	Imidacloprid	40 g	12.66	1.78	1.32	2.65	1.63	1.47	1.36	1.69	91.0 %
	17.8 SL		(3.62)	(1.5)	(1.34)	(1.77)	(1.45)	(1.4)	(1.36)	(1.48)	
3.	Acetamiprid	20 g	11.56	3.91	2.88	5.35	5.26	3.07	2.84	3.88	79.4 %
	20 SP		(3.47)	(2.1)	(1.84)	(2.42)	(2.4)	(1.89)	(1.83)	(2.09)	
4.	Fipronil	15 g	11.37	4.51	2.77	5.7	4.6	2.99	3.34	3.98	78.8 %
	5 % SC		(3.44)	(2.24)	(1.81)	(2.49)	(2.26)	(1.87)	(1.96)	(2.11)	
5.	Spinosad	250 ml	12.78	5.06	5.35	7.22	7.28	4.83	4.6	5.72	69.6 %
	45 SC		(3.64)	(2.36)	(2.42)	(2.78)	(2.79)	(2.31)	(2.26)	(2.49)	
6.	Thiamethoxam	250 g	11.33	2.7	1.99	5.26	3.22	2.25	2.45	2.97	84.2 %
	25 WG		(3.43)	(1.79)	(1.58)	(2.4)	(1.93)	(1.66)	(1.72)	(1.86)	
7.	Bifenthrin	500ml	11.66	4.92	3.5	6.89	5.9	4.34	3.91	4.9	73.89 %
	10 EC		(3.48)	(2.33)	(2.0)	(2.72)	(2.53)	(2.2)	(2.1)	(2.32)	
8.	Untreated	--	11.14	15.68	17.89	18.96	19.2	19.6	21.7	18.83	-
	control		(3.41)	(4.02)	(4.28)	(4.41)	(4.43)	(4.48)	(4.71)	(4.39)	
	S.E.		N.S.	0.08	0.07	0.09	0.09	0.08	0.07	-	-
	C.D. @ 5%		N.S.	0.24	0.23	0.23	0.27	0.24	0.21	0.23	-

DAS – Days after spraying]
Figures in parentheses are square root of (X+0.5) transformed values.

Table 4: Efficacy of newer insecticides as foliar sprays against thrips in okra (No. of thrips/3 leaves)

Sr. No.	Insecticides	Dose / ha		First spraying			Second spraying			Overall mean	% reduction over UTC
			Pre-count	2 DAS	7 DAS	15 DAS	2 DAS	7DAS	15 DAS		
1.	Imidacloprid	15 g	9.36	2.49	2.09	2.52	2.59	2.02	1.96	2.2	85.31%
	17.8 SL		(3.14)	(1.73)	(1.61)	(1.74)	(1.76)	(1.59)	(1.57)	(1.66)	
2.	Imidacloprid	40 g	10.06	1.42	1.39	1.51	1.49	1.32	1.29	1.4	90.65%
	17.8 SL		(3.24)	(1.38)	(1.37)	(1.42)	(1.41)	(1.35)	(1.33)	(1.37)	
3.	Acetamiprid	20 g	9.27	3.07	2.88	3.99	3.91	3.7	2.77	3.6	75.96%
	20 SP		(3.12)	(1.89)	(1.84)	(2.12)	(2.17)	(2.1)	(1.81)	(2.02)	
4.	Fipronil	15 g	8.36	3.58	3.74	4.6	4.65	5.06	3.5	4.18	72.1%
	5 % SC		(2.97)	(2.02)	(2.06)	(2.26)	(2.27)	(2.36)	(2.0)	(2.16)	

5.	Spinosad	250 ml	9.05	4.6	5.75	6.2	6.57	6.2	5.7	5.83	61.1%
	45 SC		(3.09)	(2.26)	(2.5)	(2.59)	(2.66)	(2.59)	(2.49)	(2.51)	
6.	Thiamethoxam	250 g	9.57	2.15	2.7	3.1	2.95	2.15	2.09	2.52	83.17%
	25 WG		(3.17)	(1.63)	(1.79)	(1.9)	(1.86)	(1.63)	(1.61)	(1.73)	
7.	Bifenthrin	500 ml	8.66	3.99	4.69	5.16	5.55	5.35	4.38	4.85	67.7%
	10 EC		(3.02)	(2.12)	(2.28)	(2.38)	(2.46)	(2.42)	(2.21)	(2.31)	
8.	Untreated	--	9.43	11.11	14.69	15.65	15.69	16.23	16.49	15.15	-
	control		(3.15)	(3.4)	(3.89)	(3.72)	(3.72)	(3.63)	(4.12)	(3.95)	
	S.E.		N.S.	0.08	0.07	0.09	0.08	0.07	0.06	-	-
	C.D. @ 5%		N.S.	0.24	0.21	0.79	0.25	0.23	0.21	0.23	-

DAS – Days after spraying
Figures in parentheses are square root of (X+0.5) transformed values.

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