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Impact of seed dressers in management of sucking pest complex infesting Okra

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Abstract

Among the newer insecticides tested for their efficacy as seed dressers against sucking pests of okra viz., leafhoppers, aphids, whiteflies and thrips, results revealed that clothianidin 600 FS @ 9ml/kg seed was significantly superior in reducing population of sucking pests and was at par with imidacloprid 70 WS @ 10g/kg seed. This was followed by clothianidin 600 FS @ 7ml/kg seed and thiamethoxam 70 WS. Clothianidin 600 FS @ 9ml/kg seed recorded 90.79, 92.83, 88.1, 85.7 per cent reduction over untreated control against leafhoppers, aphids, whiteflies and thrips respectively and also recorded maximum marketable yield of okra fruits (58.9 q/ha) with 98.96 per cent increase over untreated control.

Keywords: Okra, Leafhoppers, Aphids, Whiteflies and thrips, Seed Dressers.

Introduction

Among the vegetable crops grown in India, Okra (*Abelmoschus esculentus* (L.) Moench) also known as lady's finger in western style and *bhendi* in Indian language is an important crop grown throughout the year. 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[1]. Whitefly besides causing direct damage, acts as a vector of yellow vein mosaic virus (YVMV), which is a major constraint for okra cultivation[2].

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.

Under such conditions use of new group of insecticides as seed dressers emerged most promising, low cost, less polluting with least interference in the natural equilibrium. Newer group of insecticides offer great scope as they maintain high toxicity to insects at lower doses and are not persistent as conventional group of insecticides.

Material and methods

The certified seeds of okra variety "Arka Anamika" were made available from the local market. After washing, the seeds were dried in shade and were treated with six insecticides in Randomized block design with four replications. 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 were given.

Observations on the incidence of aphids, jassids, thrips and whiteflies were recorded on ten randomly selected plants per plot. Number of aphids, jassids, thrips and whiteflies were recorded from three leaves of each randomly selected plants, one upper, one middle and one lower[3].

The observations were recorded at 10, 20, 30 and 45 days after complete emergence of seedlings in all treatments. The average number of pest individuals per three leaves of a plant for each plot were calculated.

Yield of marketable okra fruits obtained from different pickings was taken into account. Weight and number of healthy fruits at each picking was calculated from each net plot. The treatment-wise total yield was calculated by summation of the yield obtained in the 1-8 pickings and then converted to quintals per hectare on the basis of area of treatment plot.

The average survival population of jassids, aphids, thrips and whiteflies were square root transformed by Poisson formula and standard statistical method of analysis of variance was applied for the analysis of the data.

Results and discussion

The data on the efficacy of various treatments in reducing leafhopper, aphids, white flies and thrips population are furnished in Table 1-4.

Table-1: Efficacy of newer insecticides as seed dressers against leafhoppers in Okra.

Sr.No.	Insecticides	Dose/kg seed	No. of leafhoppers/ 3 leaves				Mean	% reduction
			10 DAS	20 DAS	30 DAS	45 DAS		over UTC
1.	Clothianidin	7.0 ml	1.13	2.25	3.91	5.26	3.13	86.01%
	600 FS		(1.28)	(1.66)	(2.1)	(2.4)	(1.9)	
2.	Clothianidin	9.0 ml	0.64	2.02	2.28	3.31	2.06	90.79%
	600 FS		(1.09)	(1.58)	(1.66)	(1.95)	(1.6)	
3.	Thiamethoxam	5.0 g	1.57	2.7	3.14	6.57	3.49	84.4%
	70 WS		(1.44)	(1.79)	(1.91)	(2.66)	(1.99)	
4.	Imidacloprid 70	10 g	0.98	1.56	2.73	3.63	2.25	89.4%
	WS		(1.22)	(1.43)	(1.79)	(2.03)	(1.65)	
5.	Carbosulfan 25	50.0 g	2.87	4.79	6.3	8.26	5.55	75.2%
	SD		(1.83)	(2.3)	(2.6)	(2.96)	(2.46)	
6.	Untreated	-	12.67	19.66	25.3	31.8	22.36	-
	control		(3.62)	(4.48)	(5.07)	(5.68)	(4.78)	
	S.E. (±)	-	0.06	0.07	0.08	0.09	-	-
	C.D. @ 5%	-	0.18	0.22	0.24	0.27	-	-

Table-2: Efficacy of newer insecticides as seed dressers against aphids in Okra.

Sr. No.	Insecticides	Dose/kg	No. of aphids/ 3 leaves				Mean	% reduction
			10 DAS	20 DAS	30 DAS	45 DAS		over UTC
1.	Clothianidin	7.0 ml	1.48	3.91	4.34	4.8	3.63	83.2 %
	600 FS		(1.41)	(2.1)	(2.2)	(2.31)	(2.03)	
2.	Clothianidin	9.0 ml	0.96	1.37	1.58	2.32	1.55	92.83 %
	600 FS		(1.2)	(1.36)	(1.5)	(1.72)	(1.43)	
3.	Thiamethoxam	5.0 g	1.93	3.34	4.6	5.06	3.73	82.74 %
	70 WS		(1.57)	(1.96)	(2.26)	(2.36)	(2.05)	
4.	Imidacloprid 70	10 g	1.34	1.76	2.12	2.89	2.02	90.65 %
	WS		(1.36)	(1.5)	(1.69)	(1.84)	(1.58)	
5.	Carbosulfan 25	50.0 g	3.07	5.36	6.73	7.0	5.54	74.4 %
	SD		(1.89)	(2.42)	(2.69)	(2.74)	(2.74)	
6.	Untreated	-	13.6	18.39	24.3	30.1	21.6	-
	control		(3.75)	(4.34)	(4.97)	(5.53)	(4.7)	
	S.E. (±)	-	0.06	0.08	0.096	0.09	-	-
	C.D. @ 5%	-	0.19	0.24	0.29	0.27	-	-

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

Table-3: Efficacy of newer insecticides as seed dressers against whiteflies in Okra.

Sr.No.	Insecticides	Dose/kg seed	No. of whiteflies/ 3 leaves				Mean	% reduction
			10 DAS	20 DAS	30 DAS	45 DAS		over UTC
1.	Clothianidin	7.0 ml	1.34	2.32	2.95	3.38	2.49	81.1 %
	600 FS		(1.36)	(1.68)	(1.86)	(1.97)	(1.73)	
2.	Clothianidin	9.0 ml	0.86	1.51	1.86	2.09	1.58	88.01 %
	600 FS		(1.17)	(1.42)	(1.53)	(1.61)	(1.44)	
3.	Thiamethoxam	5.0 g	1.54	2.25	3.14	4.47	2.85	78.4 %
	70 WS		(1.43)	(1.66)	(1.91)	(2.23)	(1.83)	
4.	Imidacloprid	10 g	1.29	1.43	2.56	3.49	2.19	82.92 %
	70 WS		(1.34)	(1.38)	(1.75)	(1.99)	(1.64)	
5.	Carbosulfan	50.0 g	3.91	4.38	4.73	6.3	4.83	63.4 %
	25 SD		(2.1)	(2.2)	(2.28)	(2.84)	(2.6)	
6.	Untreated	-	11.89	12.62	13.6	14.6	13.17	-
	control		(3.51)	(3.62)	(3.75)	(3.88)	(3.69)	
	S.E. (±)	-	0.06	0.07	0.08	0.09	-	-
	C.D. @ 5%	-	0.18	0.21	0.24	0.26	-	-

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

Table-4: Efficacy of newer insecticides as seed dressers against thrips in Okra.

Sr.No.	Insecticides	Dose/kg seed	No. of thrips/ 3 leaves				Mean	% reduction
			10 DAS	20 DAS	30 DAS	45 DAS		over UTC
1.	Clothianidin	7.0 ml	1.13	3.03	3.14	3.49	2.69	77.59 %
	600 FS		(1.28)	(1.88)	(1.91)	(2.12)	(1.78)	
2.	Clothianidin	9.0 ml	0.62	1.46	1.98	2.83	1.72	85.7 %
	600 FS		(1.05)	(1.4)	(1.57)	(1.82)	(1.49)	
3.	Thiamethoxam	5.0 g	1.34	2.25	3.91	4.29	2.94	75.5 %
	70 WS		(1.36)	(1.65)	(2.1)	(2.19)	(1.85)	
4.	Imidacloprid 70	10 g	0.97	1.98	2.36	3.21	2.13	82.3 %
	WS		(1.21)	(1.54)	(1.69)	(1.92)	(1.62)	
5.	Carbosulfan 25	50.0 g	2.06	3.18	4.69	5.66	3.89	67.6 %
	SD		(1.6)	(1.92)	(2.28)	(2.38)	(2.09)	
6.	Untreated	-	11.54	11.86	12.1	12.46	12.0	-
	control		(3.47)	(3.51)	(3.54)	(3.6)	(3.53)	
	S.E. (±)	-	0.07	0.08	0.09	0.07	-	-
	C.D. @ 5%	-	0.21	0.24	0.26	0.23	-	-

Figures in parenthesis are square root of (X+0.5) transformed values. DAS - Days after sowing.

Table-5: Effect of newer insecticides as seed dressers on yield of Okra

Sr.No.	Treatments	Dosage/kg seed	Mean yield of okra fruit (q/ha)	Increase over control (q/ha)	Per cent increase over control
1.	Clothianidin 600 FS	7 ml	54.6	25.0	84.45
2.	Clothianidin 600 FS	9 ml	58.9	29.3	98.96
3.	Thiamethoxam 70 WS	5 g	54.2	24.6	83.18
4.	Imidacloprid 70 WS	10 g	56.6	27.0	91.2
5.	Carbosulfan 25 SD	50.0 g	47.9	18.3	61.8
6.	Untreated control	-	29.6	-	-
	S.E.(±)	-	0.1	-	-
	C.D.(5 %)	-	0.31	-	-

Leaf hopper *(Amrasca biguttula biguttula)*: When the overall mean population of leafhoppers was taken in to account, considerably less population density was noticed in clothianidin 600 FS @ 9ml/kg seed (2.06 leafhoppers/3 leaves) which was at par with imidacloprid 70 WS (2.25 leafhoppers/3 leaves). This was followed by clothianidin 600 FS @ 7ml/kg seed (3.13 leafhoppers/3 leaves), thiamethoxam 70 WS (3.49 leaf hoppers/3 leaves) and carbosulfan 25 SD (5.55 leafhoppers/3 leaves). The highest reduction in the population over untreated control was noticed in case of clothianidin 600 FS @9 ml/kg seed (90.79%). The results of the present investigations are in agreement with the findings of earlier workers.

Udikeri *et al.*[4] reported that clothianidin 600 FS @ 9 ml/kg seed and imidacloprid 70 WS @10 g/kg seed effectively managed leafhopper population in okra where as Sinha and Sharma[5] reported that imidacloprid 3g a.i./kg seed successfully managed leafhopper population in okra. However, the cotton crop was found to be free from jassids up to 35-60 days after germination due to seed treatment with thiamethoxam @ 4-4.3g/kg seed[6]. Rana *etal.*[7] reported that seed treatment of okra with carbosulfan 25 SD @ 4g/kg seed is effective in controlling early season sucking pests in seed crop of okra.

Aphid (*Aphis gossypii*): Mean aphid population of all treatments revealed that the least aphid count was recorded in clothianidin 600 FS @ 9ml/kg seed (1.55 aphids/3 leaves) and imidacloprid 70 WS (2.02 aphids/3 leaves) followed by clothianidin 600 FS @ 7ml/kg seed (3.63 aphids/3 leaves), thiamethoxam 70 WS (3.73 aphids/3 leaves) and carbosulfan (5.54 aphids/ 3 leaves). All the treatments proved their superiority over untreated control. Clothianidin 600 FS @ 9 ml/kg seed provided excellent protection against aphids by keeping the aphid population below ETL level up to 45 days after sowing.

The present investigation on newer insecticides as seed dressers against okra aphid is in line with the findings of Patil *et al.*[8] and according to them clothianidin 50 per cent WD @ 20 and 25 g a.i./ha was effective against aphids in cotton. Day *et al.*[9] reported that imidacloprid 70 WS provided excellent protection against okra aphid up to 45 days after sowing.

The effectiveness of carbosulfan (0.05%) in controlling okra aphid was reported by Chinnaiah[10].

Whitefly (*Bemisia tabaci*): Mean whitefly population of all treatments revealed that least whitefly population was recorded in clothianidin 600 FS @ 9ml/kg seed (1.58 whiteflies/3 leaves) and imidacloprid 70 WS (2.19 whiteflies/3 leaves) followed by clothianidin 600 FS @ 7ml/kg seed, thiamethoxam 70 WS and carbosulfan 25 SD (2.19, 2.49 and 2.85 whiteflies/3 leaves respectively).

The present findings are in close agreement with the earlier observations made by Udikeri *et al*.[4] who reported that seed treatment with clothianidin 600 FS afforded protection against whiteflies in cotton. Day *et al.*[9] reported that imidacloprid 70 WS provided excellent protection against whiteflies up to 45 days after sowing.

Kale *et al*.[11] indicated that thiamethoxam seed treatment @ 5 g/kg seed followed by alphamethrin 0.05% spray was the most effective treatment in reducing whitefly populations. The effiacacy of carbosulfan 25 SD @ 4g/kg seed in controlling whiteflies in seed crop of okra was recorded by Rana *et al.*[7].

Thrips (*Thrips tabaci*): When overall mean population of thrips was taken into account, considerably less density of thrips was noticed in the treatment with clothianidin 600 FS @ 9 ml/kg seed (1.72 thrips/3 leaves) which was at par with imidacloprid 70 WS (2.13 thrips/3leaves). This was followed by clothianidin 600 FS @ 7ml/kg seed (2.69 thrips/3 leaves), thiamethoxam 70 WS (2.94 thrips/3 leaves) and carbosulfan 25 SD (3.89 thrips/3 leaves). The superiority of clothianidin has been documented by

Dhandapani *et al.* who revealed that clothianidin (Poncho 600 FS) @ 12 ml/kg seed effectively controlled thrips in cotton up to 8 weeks after sowing. Patil *et al.* reported the effectiveness of thiamethoxam –cruiser 35 FS in reducing population of thrips and recorded higher yield of seed cotton.

Rana *et al*. reported the effectiveness of carosulfan 25 SD @ 4 g/kg seed in controlling thrips in seed crop of okra.

Conclusion

Considering the overall results obtained it is inferred that clothianidin 600 FS was found to be superior in controlling leafhoppers, aphids, whiteflies and whiteflies such an efficacy may be due to flowable suspension formulation of clothianidin (Poncho 600 FS) in thick liquid state which has got an edge over WS formulations for seed treatment in terms of easiness in treating seeds and also the performance to check sucking pest population. Therefore it, appears to be a promising option.

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