Indian Journal of Entomology, **77**(3): 230-234 (2015) DOI No. 10.5958/0974-8172.2015.00048.6

EVALUATION OF INSECTICIDES FOR THE MANAGEMENT OF SESAME PHYLLODY VECTOR, *OROSIUS ALBICINCTUS* DISTANT

ROJEET THANGJAM* AND A. S. VASTRAD

Department of Agricultural Entomology,
University of Agricultural Sciences, Dharwad- 580005
**E-mail: rojeetthangjam@gmail.com*

ABSTRACT

A field experiment was conducted to assess the effect of insecticides along with conventional ones like monocrotophos 36 SL, a plant product, nimbecidine and an antibiotic, tetracycline against leafhopper, *Orosius albicinctus* Distant which is a vector of sesame phyllody in sesame. The results revealed that all the systemic insecticides were superior. Among these treatments T_1 (imidacloprid 600FS seed treatment + imidacloprid 17.8 SL spraying.) and T_5 (imidacloprid 600FS seed treatment + lambda cyhalothrin 5 EC spraying) were highly superior. Seed yields were highest in all the insecticidal treatments compared to control, and among treatments T_1 and T_5 recorded maximum seed yields (4.47 and 4.41q/ha, respectively). The results on benefit cost ratio revealed that highest benefit cost ratio was recorded in treatment T_5 (imidacloprid 600FS seed treatment + lambda cyhalothrin 5 EC spraying).

Key words: Imidacloprid, seed treatment, lambda cyhalothrin, monocrotophos

Sesame (*Sesamum indicum*) is an important oilseed crop grown in tropics and subtropics. India ranks first in area (17.5 lakh ha) and production (8.93 lakh tones) and productivity is 368 kg/ha. Its productivity is quite low as compared to world's average (489 kg/ha) (Anonymous, 2012). In Karnataka, it is grown during *kharif* and the crop is affected by many pests and diseases. One of the important pests is leafhopper, *Orosius albicinctus* Distant which transmits phyllody diseases caused by phytoplasmas. As much as 10-100% incidence had been recorded (Brar and Ahuja, 1979). The yield loss due to phyllody in India is estimated to be about 39-74% (Saharan *et al.*, 2005).

MATERIALS AND METHODS

Experiments were conducted during summer and *kharif* - 2011 with variety DSS-9 in Entomology field, University of Agricultural Sciences, Dharwad to evaluate the efficacy of new insecticides against leafhopper, *Orosius albicinctus*. The trials were laid out in randomized complete block design with three replications, each in 5 m × 2.5 m plots keeping 30 cm row to row and 15 cm plant to plant distance. All the recommended agronomical practices were followed. The details of insecticides tested and concentrations are given in the Table 1 and 2. The insecticides were applied twice at 35 and 55 days after sowing during summer 2011, and once at 50 days after sowing during *kharif* 2011 when the vectors appeared. Ten plants were selected randomly from each plot and the number of leafhoppers were counted. From net plot, disease percentage was calculated by counting the total number of infected plants and total number of plants in the plot. The observations were recorded one day before and 1st, 3rd, 5th and 7th day after spraying at weekly intervals and the data was statistically transformed and analyzed. Yield of sesame were also recorded from net plot.

RESULTS AND DISCUSSION

The data pertaining to the population in summer 2011 showed that there were no significant differences in pre-count population in treatments just before insecticidal spray (Table 1). The population was significantly reduced in all the treatments during the 1st and 2nd spray and in pooled mean. Pooled data of 1st spray indicated that among all the treatments T_1 (imidacloprid 600FS - imidacloprid 17.8 SL) (0.17 / plant) was significantly superior followed by T_5 (imidacloprid 600FS – lambda cyhalothrin 5 EC) (0.25/ plant) (Table 1).

The pooled data of 2nd spray indicated that among all the treatments T_1 recorded lowest population (0.25 / plant) over control (4.42 / plant) and on par with T_5 (0.33 / plant) followed by T_2 and T_3 (0.58 / plant) which were significantly varying from the above and

Table 1. Efficacy of insecticides against sesame leafhopper (summer 2011)

	Treatments	Dose (g a,i/ha)	No. of leafhoppers / plant												Phyllody (%)
			1st spray					Pooled	2nd spray					Pooled	
			1DBS	1DAS	3DAS	5DAS	7DAS		1DBS	1DAS	3DAS	5DAS	7DAS		
T1	Imidacloprid 600FS - Imidacloprid 17.8 SL	5ml/kg seed & 0.3ml/l	1.67 a (1.63)	0.33 b (1.14)	0.00 d (1.00)	0.00 d (1.00)	0.33 g (1.14)	0.17 f (1.07)	2.67 c (1.91)	0.33 e (1.14)	0.00 f (1.00)	0.33 e (1.14)	0.33 g (1.14)	0.25g (1.11)	0.12 d (1.06)
T2	Imidacloprid 600FS - Acetamiprid 20SP	5ml/kg seed & 0.3g/l	1.67 a (1.63)	0.33 b (1.14)	0.33 cd (1.14)	0.33 cd (1.14)	0.67 f (1.28)	0.42 d (1.19)	2.67 c (1.91)	0.33 e (1.14)	0.33 f (1.14)	0.67 de (1.28)	1.00 e (1.41)	0.58 f (1.25)	0.25 cd (1.11)
T3	Imidacloprid 600FS - Thiamethoxam 25WG	5ml/kg seed & 0.3g/l	1.33 a (1.52)	0.33 b (1.14)	0.33 cd (1.14)	0.33 cd (1.14)	1.00 f (1.41)	0.50 d (1.22)	3.33 b (2.08)	0.33 e (1.14)	0.33 f (1.14)	0.67 de (1.28)	1.00 e (1.41)	0.58 f (1.25)	0.37 b-d (1.16)
T4	Imidacloprid 600FS - Thiacloprid 21.7SL	5ml/kg seed & 1ml/l	1.67 a (1.63)	0.33 b (1.14)	0.33 cd (1.14)	0.33 cd (1.14)	1.33 e (1.52)	0.58 d (1.25)	3.33 b (2.08)	0.67 d (1.28)	0.33 f (1.14)	1.00 c-e (1.41)	1.00 e (1.41)	0.75 e (1.32)	0.25 cd (1.11)
T5	Imidacloprid 600FS - Lambda cyhalothrin 5 EC	5ml/kg seed & 0.5 ml/l	1.33a (1.52)	0.33 b (1.14)	0.00 d (1.00)	0.00 d (1.00)	0.67 f (1.28)	0.25 e (1.11)	2.67 c (1.91)	0.33 e (1.14)	0.00 f (1.00)	0.33 e (1.14)	0.67 f (1.28)	0.33 g (1.15)	0.25 cd (1.11)
T6	Imidacloprid 600FS - Tetracycline 500ppm	5ml/kg seed & 1ml/l	1.67 a (1.63)	0.67 b (1.28)	0.67 c (1.28)	1.33 b (1.52)	1.67 d (1.63)	1.08 c (1.44)	3.33 b (2.08)	1.00 c (1.41)	1.67 c (1.63)	2.33 bc (1.82)	2.67 c (1.91)	1.92 c (1.70)	0.49 bc (1.22)
T7	Imidacloprid 600FS - Acephate 75 SP	5ml/kg seed & 1g/l	1.67 a (1.63)	0.33 b (1.14)	0.33 cd (1.14)	0.67 c (1.28)	1.00 f (1.41)	0.58 d (1.25)	3.00 b (2.00)	0.33 e (1.14)	0.67 e (1.28)	0.67 de (1.28)	1.00 e (1.41)	0.67 ef (1.28)	0.25 cd (1.11)
T8	Imidacloprid 600FS - Nimbecidine300 ppm	5ml/kg seed & 3ml/l	1.33 a (1.52)	0.33 b (1.14)	0.67 c (1.28)	1.33 b (1.52)	2.00 c (1.73)	1.08 c (1.44)	3.33 b (2.08)	1.00 c (1.41)	1.33 d (1.52)	2.00 b-d (1.73)	2.33 d (1.82)	1.67 d (1.63)	0.62 b (1.26)
T9	Monocrotophos 36 SL(Check and spray only)	1ml/l	1.67 a (1.63)	0.67 b (1.28)	1.00 b (1.41)	1.67 b (1.63)	2.33 b (1.82)	1.42 b (1.55)	3.33 b (2.08)	1.33 b (1.52)	2.00 b (1.73)	2.67 b (1.91)	3.00 b (2.00)	2.25 b (1.80)	0.62 b (1.26)
T10	Untreated control	-	1.67 a (1.63)	2.00 a (1.73)	2.33 a (1.82)	3.00 a (2.00)	3.67 a (2.16)	2.75 a (1.93)	4.00 a (2.24)	4.67 a (2.38)	4.00 a (2.23)	4.33 a (2.29)	4.67 a (2.38)	4.42 a (2.33)	1.48 a (1.56)
	S.Em±		0.13	0.13	0.11	0.12	0.11	0.06	0.11	0.10	0.11	0.13	0.07	0.05	0.09
	CD 5%		NS	0.40	0.33	0.35	0.32	0.17	0.33	0.30	0.32	0.40	0.22	0.15	0.26
	CV		14.23	19.08	15.45	15.33	12.08	7.32	9.58	12.68	13.63	15.35	7.98	6.02	12.74

*Note: Figures in the parentheses are $\sqrt{x+1}$ transformed values; In a column, means followed by similar letters do not differ statistically by DMRT (0.05);
NS = Non significant DBS=day before spray DAS= Days after spray

Table 2. Bioefficacy of insecticides against sesame leafhopper (*kharif* - 2011)

	Treatments	Dose (g a,i/ha)	No. of leafhoppers / plant 1DBS	1DAS	3DAS	5DAS	7DAS	Pooled	Phyllody (%)	Yield (q/ ha)
T1	Imidacloprid 600FS - Imidacloprid 17.8 SL	5ml/kg seed & 0.3ml/l	1.33 a (1.53)	0.33 d (1.14)	0.00 e (1.00)	0.00 f (1.00)	0.33 h (1.14)	0.17 i (1.07)	0.00 f (1.00)	4.47 a (2.34)
T2	Imidacloprid 600FS - Acetamiprid 20SP	5ml/kg seed & 0.3g/l	1.00 a (1.41)	0.33 d (1.14)	0.33 de (1.14)	0.33 e (1.14)	0.67 g (1.28)	0.42 gh (1.19	0.00 f (1.00)	4.16 c (2.27)
T3	Imidacloprid 600FS - Thiamethoxam 25WG	5ml/kg seed & 0.3g/l	1.33 a (1.53)	0.33 d (1.14)	0.33 de (1.14)	0.67 d (1.28)	0.67 g (1.28)	0.50 fg (1.22)	0.12 ef (1.06)	4.11 d (2.26)
T4	Imidacloprid 600FS - Thiacloprid 21.7SL	5ml/kg seed & 1ml/l	1.33 a (1.53)	0.33 d (1.14)	0.67 cd (1.28)	0.67 d (1.28)	1.00 f (1.41)	0.67 f (1.29)	0.12 ef (1.06)	4.00 e (2.24)
T5	Imidacloprid 600FS - Lambda cyhalothrin 5 EC	5ml/kg seed & 0.5 ml/l	1.00 a (1.41)	0.33 d (1.14)	0.00 e (1.00)	0.33 e (1.14)	0.33 h (1.14)	0.25 hi (1.11)	0.00 f (1.00)	4.41 b (2.33)
T6	Imidacloprid 600FS - Monocrotophos 36 SL	5ml/kg seed & 1ml/l	1.00 a (1.41)	0.67 cd (1.28)	0.67 cd (1.28)	1.00 d (1.41)	2.00 d (1.73)	1.08 de (1.44)	0.25 de (1.11)	3.13 f (2.03)
T7	Imidacloprid 600FS – Acephate 75 SP	5ml/kg seed & 1ml/l	1.00 a (1.41)	0.33 d (1.14)	0.67 cd (1.28)	0.67 d (1.28)	1.00 f (1.41)	0.67 f (1.29)	0.12 ef (1.06)	3.99 e (2.23)
T8	Imidacloprid 600FS - Nimbecidine 300 ppm	5ml/kg seed & 3ml/l	1.33 a (1.52)	0.33 d (1.14)	0.67 cd (1.28)	1.00 d (1.41)	1.67 e (1.63)	0.92 e (1.38)	0.37 cd (1.17)	3.03 g (2.01)
T9	Imidacloprid 600FS - Tetracycline	5ml/kg seed & 500ppm	1.33 a (1.53)	1.00 bc (1.41)	1.00 c (1.41)	1.33 c (1.52)	2.00 d (1.73)	1.33 c (1.52)	0.25 de (1.11)	2.76 h (1.94)
T10	Imidacloprid 600FS (seed treatment only)	5ml/kg seed	1.00 a (1.41)	1.33 b (1.52)	1.67 b (1.63)	2.00 b (1.73)	3.00 b (2.00)	2.00 b (1.73)	0.49 bc (1.22)	2.33 i (1.83)
T11	Monocrotophos 36 SL (Check and spray only)	1ml/l	1.67 a (1.63)	0.67 cd (1.28)	0.67 cd (1.28)	1.00 d (1.41)	2.33 c (1.82)	1.17 cd (1.47)	0.62 b (1.27)	3.04 g (2.01)
T12	Untreated control	-	1.67 a (1.63)	2.33 a (1.82)	3.00 a (2.00)	3.33 a (2.08)	3.33 a (2.08)	3.00 a (2.00)	1.36 a (1.53)	1.56 j (1.60)
	S.Em±		0.08	0.12	0.12	0.10	0.10	0.06	0.04	0.01
	CD 5%		NS	0.36	0.35	0.30	0.29	0.19	0.13	0.02
	CV		9.62	16.93	15.92	13.16	11.23	8.18	6.94	0.70

*Note: Figures in the parentheses are $\sqrt{x+1}$ transformed values; In a column, means followed by similar letters do not differ statistically by DMRT (0.05);
NS = Non significant DBS=day before spray DAS= Days after spray

Table 3. Cost economics

Sl. No.		Treatments	Dosage	Cost of cultivation (Rs/ha)	Yield (q/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
1	T1	Imidacloprid 600FS - Imidacloprid 17.8 SL	5ml/kg seed & 0.3ml/l	6975.75	4.47	29055	22079	3.17
2	T2	Imidacloprid 600FS - Acetamiprid 20SP	5ml/kg seed & 0.3g/l	7200.75	4.16	27040	19839	2.76
3	T3	Imidacloprid 600FS - Thiamethoxam 25WG	5ml/kg seed & 0.3g/l	7245.75	4.11	26715	19469	2.69
4	T4	Imidacloprid 600FS - Thiacloprid 21.7SL	5ml/kg seed & 1ml/l	7705.75	4.00	26000	18294	2.37
5	T5	Imidacloprid 600FS - Lambda cyhalothrin 5 EC	5ml/kg seed & 0.5 ml/l	6805.75	4.41	28665	21859	3.21
6	T6	Imidacloprid 600FS - Monocrotophos 36 SL	5ml/kg seed & 1ml/l	6865.75	3.13	20345	13479	1.96
7	T7	Imidacloprid 600FS – Acephate 75 SP	5ml/kg seed & 1ml/l	6725.75	3.99	25935	19209	2.86
8	T8	Imidacloprid 600FS - Nimbecidine 300 ppm	5ml/kg seed & 3ml/l	7095.75	3.03	19695	12599	1.78
9	T9	Imidacloprid 600FS - Tetracycline	5ml/kg seed & 500ppm	6812.42	2.76	17355	10543	1.55
10	T10	Imidacloprid 600FS (seed treatment only)	5ml/kg seed	6645.75	2.33	15145	8499	1.28
11	T11	Monocrotophos 36 SL (Check and spray only)	1ml/l	6832.00	3.04	19760	12928	1.89
12	T12	Untreated control		6612.00	1.56	10140	3528	0.53

*Price of sesame seeds per quintal Rs. 6,500 (2011).

were on par with each other. (Table 1). The incidence of phyllody was highest in control (1.48 %) and lowest in treatment T_1 (0.12 %) while T_2, T_4, T_5 and T_7 were on par with each other (0.25 %). Eventhough the phyllody disease was recorded in different treatments their incidence was very low (Table 1).

There was no significant difference in population during kharif 2011 in all the treatments before spraying. The population was significantly reduced after insecticidal applications. The pooled data indicated that T_1 was significantly superior in reducing the population (0.17). T_5 (0.25), T_2 (0.42) and T_3 (0.50 / plant) were significantly different from each other. The phyllody incidence was negligible which ranged from 0.12 to 1.36 %. No incidence was noticed in T_1, T_2 and T_5 treatments while T_3, T_4 and T_7 recorded 0.12 %. % in T_8 (Table 2).

The influence of treatments on seed yield revealed that it was significantly higher with the application of insecticides (2.33 - 4.47 q/ha) compared to control (1.56 q/ha) (Table 2). Significantly highest yield was recorded from treatment T_1 (4.47 q/ha) followed by T_5, T_2, and T_3 (4.41, 4.16 and 4.11 q/ha, respectively). Grain yield of 4.00 q/ha was obtained in T_4 and on par with T_7 (3.99 q/ha). The results on benefit cost ratio revealed that highest benefit cost ratio was recorded in treatment T_5 (3.21). This was followed by treatments T_1, T_7, T_2, T_3 and T_4. The lowest BC ratio of 1.28 was recorded in treatment T_{10} (Table 3).

These results are in agreement with Jyothirmai *et al.* (2002) who reported that application of imidacloprid 70 WS seed treatment at 5 g/kg seed + imidacloprid (Confidor 200 SL) 0.01% foliar spray drastically reduced leafhoppers (*Empoasca kerri* Pruthi) population and increased the pod yield of groundnut. Venkanna Yasa (2010) reported that foliar application of imidacloprid @ 26.7g a.i./ha at 25 and 40 days after sowing was found to be significantly effective in reducing leafhoppers (*E. kerri* Pruthi) on groundnut and also superior among various neonicotinoid group *viz.*, acetamiprid and thiamethoxam. Lal and Sinha (2005) reported that imidacloprid seed treatments @ 5g/kg seed along with two foliar sprays of betacyfluthrin or altering of lambda cyhalothrin and endosulfan were the most effective treatments in managing leafhoppers (*Amrasca biguttula biguttula* Ishida) in okra. Similarly, Dey *et al.* (2005) reported that imidacloprid 70 WS @ 5-10g/kg seed and imidacloprid 20 SL @ 100-125 ml/ha were found highly effective and significantly superior to carbosulfan 25 DS @ 50 g/kg in controlling the leafhopper (*A. biguttula biguttula*) in okra.

REFERENCES

Anonymous, 2012. Third advance estimates of production of oilseeds & other commercial crops for 2011-12, Directorate of Economics & Statistics, Department of Agriculture & Cooperation, Agricultural Statistics Division (India).

Brar, G.S. and Ahuja, K.L. 1979. Sesame, its culture, genetics, breeding and biochemistry. *Annual Review of Plant Sciences.* (Malik, C. P. Ed.), Kalyani Publishers, New Delhi, India, 245p.

Dey, P.K., Jana, S.K., Chakraborty, G. and Somchoudhury, A.K. 2005. Evaluation of imidacloprid (70 WS- 20 SL) against sucking pest complex of okra, *Abelmoschus esculentus*. *Journal of Entomological Research*, **29**(3): 215-218.

Jyothirmai, T., Murali, K.T., Ramaiah, M., Padmavathamma, K. and Ramakrishna Rao, A. 2002. Efficacy of different insecticides against jassids on groundnut. *Journal of Entomological Research*, **26** (4): 291-295.

Lal, O.P. and Sinha, S.R. 2005. Impact of imidacloprid seed treatment along with some insecticidal spraying against insect pests of okra. *Indian Journal of Entomology*, **67**(4): 328-333.

Saharan, G.S., Mehta, N. and Sangwan, M.S. 2005. *Diseases of Oilseed Crops.* Indus Publishing Company, India, 306p.

Venkanna, Yasa, Ranga Rao, G.V. and Dharma Reddy, K. 2010. Bioefficacy of neonicotinoid insecticides against thrips, *Scirtothrips dorsalis* and leafhoppers, *Empoasca kerri* in groundnut. *Indian Journal of Plant Protection*, **38**(2): 134-138.

(Manuscript Received: June, 2014)