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MANAGEMENT OF LEAFHOPPER (*Orosius albicintus)* OF SESAMUM WITH CERTAIN INSECTICIDES

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ABSTRACT

A field experiment was carried out during *Kharif* 2018 at dry land farm, S.V. Agricultural College, Tirupati to assess theefficacy of certain insecticides against leafhopper (*Orosius albicintus*) of sesame. Results on efficacy of certain insecticides against leafhopper, *O. albicinctus* at 3 DAS revealed that the chemical treatment with pymetrozine @ 0.4 g L^{-1} showed highest per cent reduction of nymphal population (91.5%) followed by imidacloprid (40 %) + ethiprole (40 %) @ 0.3 g L^{-1} (73.7 %), acephate @ 1.5 g L^{-1} (73.1%), dinotefuron @ 0.3 g L^{-1} (72.1%), diafenthiuron @ 1.3 g L^{-1} (70.6%), The lowest per cent reduction was recorded in flonicamid @ 0.4 g L^{-1} (69.3%), thiamethoxam (seed treatment) (25.6 %), imidacloprid (seed treatment) (12.7 %).

KEYWORDS: Sesamum,leafhopper, efficacy and insecticides

INTRODUCTION

Sesame (*Sesamum indicum* L.) is one of the oldest oil seed crops and has been cultivated in Asia since ancient times. It is grown in more than 50 countries in the world. At global level, it is cultivated on an area of 7.41 m ha with a production of 2.94 MT of seeds. India, China, Sudan, Mexico, Turkey, Burma and Pakistan are the important sesame producing countries (FAOSTAT, 2017). In India it is cultivated in an area of 1.77 Mha with an annual production of 0.71MT. Though India is the major producer of sesamum, with one third of world's acreage and approximately a quarter of world's production, the average productivity of this crop in India is quite low *i.e.,* 426 kg ha^{-1} (Indianstat, 2017). Sesame is a short duration crop and is grown mostly under rainfed conditions with poor crop management resulting in low yields. Pests and diseases are another major factor for reduction in yield.As many as 29 species of insect pests attack the crop at different stages of crop growth (Rai, 1976).

Among the pests and diseases, phyllody caused by phytoplasma is a major potential disease in most sesame growing regions. In warm climates, this disease inflict up to 80 per cent yield loss with a disease intensity of 61-80 per cent (Kumar and Mishra, 1992; Salehi and Izadpanah, 1992). This phytoplasma disease is transmitted by sesamum leafhopper (*Orosius albicinctus*) (Sahambi, 1966). Manoharan *et al.* (1997) reported that phyllody disease was transmitted by the *Orosius albicinctus* as one of most destructive disease limiting the productivity in India and causing up to 55 per cent yield losses. Pesticides continue to be one of the most powerful tools available for managing insect vectors and increasing crop yield in majority of the crops including sesame.

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MATERIALS AND METHODS

A field experiment was conducted at dry land farm, S.V. Agricultural College, Tirupati during summer 2018-2019, to evaluate the efficacy of certain new insecticides against sesamum leafhopper. The experiment was laid out in a randomized block design with nine treatments including untreated control and replicated thrice. The size of the individual plot was 5 m x 4 m, with spacing of 30 cm between the rows and 10 cm between the plants. All the recommended package of practices were adopted in managing crop to maintain a good crop stand. "YLM-66", a popular sesame variety was sown on 17th August, 2018. Seed treatment was done by measuring known quantity of seed *i.e.,* 50 gms of sesamum seed and mixing them with 250 micro litres of imidacloprid 600FS and 250 micro litres of Thiomethaxom 35FS.Seeds were sown normally in all the plots except in plots receiving seed treatment where the seeds were treated with imidacloprid and thiomethoxam as seed treatment and were sown later. The remaining insecticidal treatments (spray) were given 30 days after sowing to coincide with maximum insect activity. Required quantity of the insecticide was measured and mixed with required quantity of water and stirred well to obtain the desired concentration of spray fluid. In case of wettable powders required quantities were mixed with a little quantity of water and then the remaining quantity of water was added to obtain desired concentration and stirred well. Insecticide treatments included in this experiment were applied with hand held knapsack sprayer at 30 days after sowing. Spraying was done during morning hours by taking care to prevent the drift of the spray fluid reaching the adjacent plots by keeping a screen in between the plots. The sprayer was cleaned with water before changing the insecticide treatment.

Method of observations

Pre-treatment counts were taken as number of nymphs for *O. albicinctus* on ten selected plants one day before spraying and post treatment counts were taken at 1st, 3rd, 5th, 7th, 9th and 11th day after spraying.

Statistical Analysis

The per cent reduction of larval population was calculated by using modified Abbots formula as given by Fleming and Retnakaran (1985).

Per cent population reduction =

$$\left[\frac{\text{Post treatment population in treatment}}{\text{Pre - treatment population in treatment}} \text{x} \frac{\text{pre - treatment population in check}}{\text{post treatment population in check}} \text{x100}\right]$$

Test insecticides

Details of insecticides used in the experiment are given in Table 1.

Table 1. Particulars of treatments used

Treatments	Chemical name	Trade name	Formulation	Dose/litre	Source of supply
T_1.	Imidacloprid (seed treatment)	Gaucho	600FS	5ml/kg of seed	M/S Bayer crop science
T_2.	Thiamethoxam (seed treatment)	Crusier	70FS	5ml/kg of seed	M/S Syngenta crop science
T_3.	Imidacloprid (40%) +Ethiprole (40%)	Glamore	80%WG	$0.3gL^{-1}$	M/S Bayer crop science
T_4.	Diafenthiuron	Pegasus	50%WP	$1.3gL^{-1}$	M/S Syngenta crop science
T_5.	Dinotefuron	Oshin	20SG	$0.3g\ L^{-1}$	M/S Biostadt india limited
T_6.	Flonicamid	Ulala	50WG	$0.4\ g\ L^{-1}$	M/S United Phosphorus limited
T_7.	Pymetrozine	Chess	50WG	0.4 g L-^{1}	M/S Syngenta crop science
T_8.	Acephate	Asataf	75% WP	$1.5\ g\ L^{-1}$	M/S Tata Rallis India Limited
T_9	Control				

Results and Discussion:

Management of leafhopper (*Orosius albicintus*) one day after spraying

At 1day after spraying, treatment with pymetrozine @ 0.4 g L^{-1} (67.3%) had given a significant per cent reduction in nymphal population followed by diafenthiuron @ 1.3 g L^{-1} (57.4%), dinotefuron @ 0.3 g L^{-1} (54.9%), acephate @ 1.5 g L^{-1} (53.3%), imidacloprid (40%) +ethiprole (40%) @ 0.3 g L^{-1} (50.5%), The lowest per cent reduction was recorded in flonicamid @ 0.4 g L^{-1} (49.6%),thiamethoxam (seed treatment) (30.9%), imidacloprid (seed treatment) (28.8%).

The order of efficacy of different treatments was as follows:

$$T_7 > T_4 > T_5 > T_8 > T_3 > T_6 > T_2 > T_1 > T_9$$

Three days after spraying

At 3day after spraying, treatment with pymetrozine @ 0.4 g L^{-1} (91.5%) had given a significant per cent reduction in nymphal population followed by imidacloprid (40%) +ethiprole (40%) @ 0.3 g L^{-1} (73.7 %), acephate @ 1.5 g L^{-1} (73.1%),dinotefuron @ 0.3g L^{-1} (72.1%), diafenthiuron @ 1.3 g L^{-1} (70.6%), The lowest -

per cent reduction was recorded in flonicamid @ 0.4 g L^{-1} (69.3%), thiamethoxam (seed treatment) (25.6%), imidacloprid (seed treatment) (12.7%).

The order of efficacy of different treatments was as follows:

$$T_7 > T_3 > T_8 > T_4 > T_5 > T_6 > T_2 > T_1 > T_9$$

Five days after spraying

At 5 day after spraying, treatment with pymetrozine @ 0.4 g L^{-1} (95.8%) had given a significant per cent reduction in nymphal population followed by dinotefuron @ 0.3 g L^{-1} (87.5%), acephate @ 1.5 g L^{-1} (84.0 %), diafenthiuron @ 1.3 g L^{-1} (81.5%), flonicamid @ 0.4 g L^{-1} (81.2%), The lowest per cent reduction was recorded in imidacloprid (40%) +ethiprole (40%) @ 0.3 g L^{-1} (79.6%), imidacloprid (seed treatment) (37.7%), thiamethoxam (seed treatment) (24.4%).

The order of efficacy of different treatments was as follows:

$$T_7 > T_5 > T_8 > T_4 > T_6 > T_3 > T_1 > T_2 > T_9$$

Seven days after spraying

At 7 DAS, treatment with pymetrozine @ 0.4 gg L^{-1} (98.7%) had given a significant per cent reduction in nymphal population followed by dinotefuron @ 0.3 g L^{-1} (92.7%), acephate @ 1.5 g L^{-1} (91.7%), diafenthiuron @ 1.3 g L^{-1} (91.2%), imidacloprid (40%) +ethiprole (40%) @ 0.3 g L^{-1} (90.9%). The lowest per cent reduction was recorded in flonicamid @ 0.4 g L^{-1} (90.3%), thiamethoxam (seed treatment) (23.6%), imidacloprid (seed treatment) (23.5%).

The order of efficacy of different treatments was as follows:

$$T_7 > T_5 > T_8 > T_4 > T_3 > T_6 > T_2 > T_1 > T_9$$

Nine days after spraying

At 9 DAS, treatment with pymetrozine @ 0.4 g L^{-1} (83.5%) had given a significant per cent reduction in nymphal population followed by acephate @ 1.5g L^{-1} @ 1.3 g L^{-1} (70.5%), imidacloprid (40%) +ethiprole (40%) @ 0.3g L^{-1} (67.0%).The lowest per cent reduction was recorded in flonicamid @ 0.4 g L^{-1} (66.8%), thiamethoxam (seed treatment) (27.6%), imidacloprid (seed treatment) (25.5%).

The order of efficacy of different treatments was as follows:

$$T_7 > T_8 > T_5 > T_4 > T_3 > T_6 > T_2 > T_1 > T_9$$

Eleven days after spraying

At 11 day after spraying, treatment with pymetrozine @ 0.4 g L^{-1} (73.5%) had given a significant per cent reduction in nymphal population followed by acephate @ 1.5 g L^{-1} (66.8%), dinotefuron @ 0.3 g L^{-1} (65.0 %), diafenthiuron @ 1.3 g L^{-1} (63.8 %), imidacloprid (40%) +ethiprole (40%) @ 0.3 g L^{-1} (60.3%). The lowest per cent reduction was recorded in flonicamid @ 0.4 g L^{-1} (60.1%), thiamethoxam (seed treatment) (26.9%), imidacloprid (seed treatment) (25.6%).

The order of efficacy of different treatments was as follows:

$$T_7 > T_8 > T_5 > T_4 > T_3 > T_6 > T_2 > T_1 > T_9$$

The results of the experiment are in line with Seni and Naik (2017) who conducted a field experiment on brown plant hopper in paddy with the treatments thiamethoxam 25 WG @ 37.50 g a.i. ha^{-1}, lamda cyhalothrin 5 EC @ 30 g a.i. ha^{-1}, pymetrozine 50 WG @ 150 g a.i. ha^{-1}, buprofezin 25 SC @ 250 g a.i. ha^{-1}, imidacloprid 40+ethiprole 40% w/w@ 80 WG @ 100 g a.i. ha-1, dinotefuran 20 SG @ 40 g a.i. ha^{-1}, acephate 75 SP @ 564 g a.i. ha^{-1},untreated control. All the treatments were effective for hoppers management than control. The overall data revealed that the pymetrozine 50 WG @ 150 g a.i. ha^{-1} recorded higher per cent reduction of hoppers and higher grain yield than the other treatments in rice crop.

However for observations taken after 3 day after spraying no significant differences were observed among different foliar insecticidal treatments but seed treatment with imidacloprid and thiomethoxam had exhibited significantly lower nymphal reduction as compared with other foliar spray treatments.

This could be due to the fact that the neonicotinoids such as imidacloprid and thiamethoxam as seed treatment protect the crop from sucking insects up to 25-30 days after treatment and the efficacy reduces with passage of time. Iqbal *et al*. (2013*)* reported that the application of insecticide (imidacloprid 20% SL, acetamiprid 20% SL, thiamethoxam 25 WG and acephate 75 SP) sprays immediately enhanced the mortality of the sucking insect pests on mungbean, *Vigna radiata* (L.). Whereas, seed treatment with imidacloprid + detergent did not show distinctive effect on the pest population. Imidacloprid and thiamethoxam were found to be the most effective insecticides against sucking pests followed by acetamiprid.

By the end of last observation (*i.e.,* 11 DAS) the crop has reached an age of 45-50 days and though there were differences in the nymphal population of leafhopper, the per cent phyllody disease in all the experimental plots have reached to the stage of 85-90 per cent and we were unable to establish any correlation between vector population and per cent disease incidence of phyllody.

No correlation between insect vector population and that of percent disease incidence of phyllody have been reported by several workers. Sellammal *et al.* (1973) who observed no clear relationship between phyllody incidence and leaf hopper population. The authors opined that it is likely that a single inoculative vector may spread the disease to varying number of plants and hence no significant correlation could be exhibited between leafhopper population and per cent disease incidence of phyllody.

As the per cent disease of phyllody have reached to the maximum level we were unable to undertake any spray and also data on yield and the experiment was terminated.

CONCLUSIONS

In the present investigation pymetrozine treated plots showed significantly higher nymphal population reduction as compared with other treatments especially at 3 days after spraying. Pymetrozine suppresses the stylet penetration of sucking insect pest especially homopterans hence leading to starvation and death (Kayser *et al.,* 1994).

LITERATURE CITED

Flemming, R and Ratnakaran, A. 1985. Evaluating single treatment data using Abbot's formula with reference to insecticides. *Journal of Ecomomic Entomology.* 78: 1179-1181.

Iqbal, J., Nadeem, M., Saddique assi, M., Malik M. F and Waqas, U.H.M. 2013. Comparative efficacy of some insecticides against sucking insect pests on mungbean, *Vigna radiata* (L.) wilczek. *Gomal University Journal of Research*. 29(1): 31-37.

Kayser, H., Kaufmann, L and Schürmann, F. 1994. Pymetrozine (CGA 215–944): a novel compound for aphid and whitefly control. An overview of its mode of action. *Proceedings of 1994 Brighton Crop Protection Conference—Pests and Diseases,* 2, 737–742.

Kumar, P and Mishra,G. 1992. Diseases of *Sesamum indicum* in Rohikhand: intensity and yield loss. *Indian Phytopathology.* 45: 121-122.

Manoharan, V., Dinakaran, D and Dharmalingam, V. 1997. Reaction of sesame breeding line to Phyllody. *Madras Agricultural Journal.* 84 (5): 277.

Rai, B. K. 1976. *Pests of Oilseed Crops in India and Their Control.* ICAR, New Delhi: 123.

Sahambi, H. S. 1966. Virus vector relationship with respect to plant virus transmitted by cicadellid leaf hopper In: *Proceeding of the First Summer School in Plant Virology* held on Hyderabad, Andhra Pradesh, India.

Salehi, M. and Izadpanah, k.1992. Etiology and transmission of sesame phyllody in Iran. *Journal of Phytopathology*. 135: 37-47.

Sellammal, M., Ramakrishn, C., Kadaswamy, T. K and Murugesan, M. 1973. Forecasting phyllody disease of sesame. *Madras Agricultural Journal.* 60: 492 – 495.

Seni, A and Naik, B. S. 2017. Evaluation of some insecticides against brown plant hopper, *Nilaparvata lugens* (Stal) in Rice, *Oryza sativa* L.*International Journal of Bio-resource and Stress Management*. 8(2):268-271.

Table 2. Effect of insecticides on per cent reduction of *Orosius albicinctus* nymphs during *Kharif* 2018.

Treatments	Chemical name	Dose	DBS	Per cent reduction of nymphal population						Mean
				1 DAS	3DAS	5DAS	7DAS	9DAS	11DAS	
T_1.	Imidacloprid (seed treatment)	5ml/kg of seed	12	28.8^{a}	12.7^{a}	37.7^{a}	23.5^{a}	25.5^{a}	25.6^{a}	25.6^{a}
T_2.	Thiamethoxam (seed treatment)	5 ml/kg of seed	12	30.9^{a}	25.6^{a}	24.4^{a}	23.6^{a}	27.6^{a}	26.9^{a}	26.5^{a}
T_3.	Imidacloprid (40%) +Ethiprole (40%)	$0.3g\ L^{-1}$	18	50.5^{b}	73.7^{bc}	79.6^{b}	90.9^{b}	67.0^{b}	60.3^{b}	70.4^{b}
T_4.	Diafenthiuron	$1.3g\ L^{-1}$	21	57.4^{bc}	70.6^{b}	81.5^{b}	91.2^{b}	70.5^{b}	63.8^{b}	72.5^{b}
T_5.	Dinotefuron	$0.3g\ L^{-1}$	20	54.9^{bc}	72.1^{bc}	87.5^{b}	92.7^{b}	70.5^{b}	65.0^{b}	73.8^{b}
T_6.	Flonicamid	$0.4g\ L^{-1}$	19	49.6^{b}	69.3^{b}	81.2^{b}	90.3^{b}	66.8^{b}	60.1^{b}	69.6^{b}
T_7.	Pymetrozine	$0.4g\ L^{-1}$	19	67.3^{c}	91.5^{c}	95.8^{b}	98.7^{b}	83.5^{b}	73.5^{b}	85.1^{b}
T_8.	Acephate	$1.5g\ L^{-1}$	20	53.3^{bc}	73.1^{bc}	84.0^{b}	91.7^{b}	74.0^{b}	66.8^{b}	73.8^{b}
T_9	Control	-	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LSD		-	-	**7.9**	**10.9**	**9.9**	**10.6**	**10.6**	**8.8**	**22.2**

Values having the same alphabet are not significantly different at 5% level of significance. DBS – day before spraying.