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Bio efficacy insecticidal treatments against thrips on summer groundnut

S.M. Mithapara[1], A.M. Bharadiya[2], D.J. Majithia[3] and B.P. Baldaniya[4]

[1]Research Scholar, Dept. of Entomology, Junagadh Agricultural University, Junagadh (India)

[2]Associate Research Scientist, Junagadh Agricultural University, Junagadh (India)

[3]Research Scholar, Dept. of Entomology, Junagadh Agricultural University, Junagadh (India)

[4]Research Scholar, Dept. of Entomology, Junagadh Agricultural University, Junagadh (India)

ABSTRACT

An experiment was carried out at the Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh. Among the six different insecticidal treatments, thiamethoxam 30 FS (Seed treatment) + spinosad 45 SC (Foliar spray) was somewhat costly but found most effective against thrips with lower no. of thrips (3.38 thrips per three terminal leaves per plant), maximum pod and haulm yield (3900 and 5560 kg/ha) with 69.57 and 72.67% increase over control and highest net realization (81360 Rs. /ha). Whereas, the treatments of imidacloprid 600 FS (Seed treatment) + spinosad 45 SC (Foliar spray) (3.48 thrips per three terminal leaves per plant, 3800 and 5420 kg/ha pod and haulm yield with 65.00 and 68.32% increase over control) and thiamethoxam 30 FS (Foliar spray) + fipronil 5 SC (Foliar spray) (3.62 thrips per three terminal leaves per plant, 3690 and 5260 kg/ha pod and haulm yield with 60.43 and 63.22 increase over control) were proved next best treatments.

Key words: Bio efficacy, thrips, insecticidal treatment, groundnut

INTRODUCTION

Groundnut (*Arachis hypogaea* Linn.) is one of the world's most important leguminous oilseed crops. The word groundnut (*Arachis hypogaea* L.) is derived from the Greek word "Arachis" meaning legume and "hypogaea" meaning below ground. It is commonly known as peanut, monkey-nut and goobernut. Groundnut is native to South America. It was found in Brazil or Peru as early as 950 BC and later spread to Africa, North America, Europe and Asia. The major groundnut producing countries are China, Nigeria, U.S.A., Taiwan, Indonesia, Senegal, Ghana, Argentina and Brazil. It is the most important commercial crop mostly grown in semi-arid tropical regions like India. The crop can be grown successfully in areas receiving rainfall from 600 mm to 1200 mm. The best soil for the groundnut crop is sandy loam, loamy and medium black (1).

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of tropical and sub-tropical regions of the world. In India, groundnut is mostly grown in five states *viz.*, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra which accounts for 70 per cent of the total area and 71 per cent of the total production of summer groundnut. In India, the total area under kharif groundnut cultivation was 40.684 lakh ha with a production of 66.152 lakh tonnes and a yield of 1626 kg/ha. However, during the summer season, it is grown in an area of 8.393 lakh ha with a production of 16.018 lakh tonnes and the yield was 1909 kg/ha. (2). Groundnut crop is grown as rain-fed in bulk during kharif season but it is also taken during the summer season, wherever, the irrigation facilities are available. The crop is grown as monoculture in the Saurashtra region of Gujarat. Junagadh, Rajkot, Amreli, Jamnagar, Bhavnagar and Kutch districts of Gujarat state contribute about 15% total production of summer groundnut of Gujarat state.

In Gujarat, the total area under kharif groundnut cultivation was 16.272 lakh ha with a production of 39708.76 million tonnes and a yield of2440 kg/ha. However, during the summer season, it is grown in an area of 0.51 lakh ha with a production of 949.29 million tonnes and the yield was 1843 kg/ha. (3).

Among different insect pests infesting this crop in Gujarat, the thrips are considered a key pest. The damage caused by this pest depends on the population of damaging stage of an insect, crop growth stage, cropping pattern in the area and prevailing environmental conditions. (5). Among different insect pests, white grub cause yield losses up

to 20-100%, tobacco caterpillar causes up to 15-30%, red hairy caterpillar causes up to 75%, leaf miner causes up to 49%, jassids causes up to 17% and thrips causes up to 17% yield losses (4).

MATERIALS AND METHODS

The field experiment was conducted at the Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during summer 2019-20. Experiment was laid out in a Randomized Block Design (RBD) with seven treatments and three replications. The row to row distance was kept to be 30 cm and plant to plant distance is 10 cm.

Time and method of application of insecticides

The seed treatment of two different insecticides was applied few hours before sowing, whereas foliar spray was given at the time of the substandard population of thrips. The sowing of treated seeds was done in a randomized block design. According to the treatments, spraying of the insecticides was applied with the help of a knapsack sprayer. The first spray was applied 45 days after sowing and the second spray was done 15 days after the first spray.

Method of recording observations

To evaluate the efficacy of different insecticides, observations on thrips were recorded visually from five randomly selected plants from their three terminal leaves. Observations on the thrips population were recorded before spray and at 3, 5, 7 and 10 days after each spray.

Observations recorded

1. No. of thrips/three terminal leaves/plant

RESULTS AND DISCUSSION

First spray

The results based on the mean thrips population are presented in Table 1. It indicated that all the experimental plots showed non-significant variation with respect to the mean thrips population before spraying and thrips population range from 5.32 to 7.34.

Table 1: Efficacy of insecticides against summer groundnut thrips after the first spray

Sr. no.	Treatment	Concentration	Mean no. of thrips per three terminal leaves per plant					
			Before spray	3 DAS	5 DAS	7 DAS	10 DAS	Pooled over periods
1	Imidacloprid 600 FS + Spinosad 45% SC	0.019% + 0.018%	2.48(6.12)	2.06(4.19)	2.06(4.33)	2.10(4.42)	2.18(4.84)	2.08(4.42)
2	Imidacloprid 600 FS + Spinetoram 11.7% SC	0.019% + 0.0117%	2.68(7.20)	2.42(5.86)	2.38(5.74)	2.42(5.96)	2.58(6.76)	2.46(6.04)
3	Imidacloprid 600 FS + Fipronil 5% SC	0.019% + 0.003%	2.72(7.34)	2.32(5.32)	2.28(5.20)	2.34(5.48)	2.36(5.68)	2.32(5.42)
4	Thiamethoxam 30 FS + Spinosad 45% SC	0.012% + 0.018%	2.58(6.74)	1.98(3.93)	1.96(3.92)	2.00(4.00)	2.08(4.34)	2.00(4.04)
5	Thiamethoxam 30 FS + Spinetoram	0.012 % + 0.0117%	2.32(5.32)	2.34(5.43)	2.36(5.54)	2.38(5.62)	2.58(6.72)	2.42(5.80)
6	Thiamethoxam 30 FS + Fipronil 5% SC	0.012% + 0.003%	2.50(6.20)	2.10(4.40)	2.08(4.38)	2.16(4.62)	2.22(4.94)	2.14(4.60)
7	Control	-	2.54(6.52)	2.79(7.77)	2.75(7.54)	2.80(7.84)	2.97(8.89)	2.83(8.08)
	S. Em.±	T	0.15	0.11	0.12	0.12	0.15	0.09
		P	-	-	-	-	-	0.05
		T x P	-	-	-	-	-	0.06
	C. D. at 5%	T	NS	0.34	0.38	0.36	0.46	0.23
		P	-	-	-	-	-	0.14
		T x P	-	-	-	-	-	NS
	C. V. %		10.26	8.49	9.39	8.75	10.61	9.31

DAS: days after Spray
NS: Non-significant
Figure in parenthesis are retransformed values, while outside are square root transformed values

The thrips population after 3 days of application revealed that in all the treatments thrips population reduced significantly over control. Seed treatment of thiamethoxam 30 FS @ 0.012% with spraying of spinosad 45 SC @ 0.018% was found most effective with 3.93 thrips per three terminal leaves per plant and found statistically at par with seed treatment of imidacloprid 600 FS @ 0.019% with spraying of spinosad 45 SC @ 0.018% (4.19 thrips per three terminal leaves per plant), seed treatment of thiamethoxam 30 FS @0.012% with spraying of fipronil 5 SC @ 0.003%(4.40) and seed treatment of imidacloprid 600 FS @ 0.019% with a spraying of fipronil 5 SC @ 0.003%(5.32). However, control recorded the highest 7.77 no. of thrips per three terminal leaves per plant. More or less same trends of efficacy were observed after 5, 7 and 10 days of application as well as pooled over first spray.

Second spray

The results based on the mean thrips population are presented in Table 2. It indicated that all the experimental plots showed non-significant variation with respect to the mean thrips population before spraying and thrips population range from 7.10 to 9.77.

Table 2: Efficacy of insecticides against summer groundnut thrips after the second spray

Sr. no.	Treatment	Concentration (%)	Mean no. of thrips per three terminal leaves per plant					
			Before spray	3 DAS	5 DAS	7 DAS	10 DAS	Pooled over periods
1	Imidacloprid 600 FS + Spinosad 45% SC	0.019 + 0.018	2.66(7.10)	1.82(3.35)	1.78(3.25)	1.86(3.49)	1.98(3.96)	1.86(3.48)
2	Imidacloprid 600 FS + Spinetoram 11.7% SC	0.019 + 0.0117	2.97(8.84)	2.22(4.97)	2.18(4.72)	2.22(4.97)	2.42(5.81)	2.26(5.08)
3	Imidacloprid 600 FS + Fipronil 5% SC	0.019 + 0.003	3.12(9.77)	2.12(3.93)	2.06(4.22)	2.12(4.46)	2.20(4.87)	2.10(4.48)
4	Thiamethoxam 30 FS + Spinosad 45% SC	0.012 + 0.018	2.85(8.17)	1.78(3.22)	1.74(3.00)	1.82(3.38)	1.94(3.70)	1.82(3.38)
5	Thiamethoxam 30 FS + Spinetoram 11.7% SC	0.012 + 0.0117	3.12(9.71)	2.08(4.33)	2.16(4.71)	2.20(4.91)	2.40(5.53)	2.22(4.95)
6	Thiamethoxam 30 FS + Fipronil 5% SC	0.012 + 0.003	2.96(8.82)	1.86(3.42)	1.80(3.33)	1.94(3.79)	1.98(3.90)	1.88(3.62)
7	Control		2.79(7.86)	2.59(6.72)	2.80(7.86)	2.81(7.95)	3.03(9.22)	2.80(7.98)
	S. Em.±	T	0.21	0.10	0.13	0.12	0.13	0.07
		P	-	-	-	-	-	0.05
		T x P	-	-	-	-	-	0.02
	C. D. at 5%	T	NS	0.31	0.40	0.37	0.41	0.20
		P	-	-	-	-	-	0.16
		T x P	-	-	-	-	-	NS
	C. V. %		12.29	8.56	10.75	9.62	10.10	9.76

DAS: days after Spray
NS: Non-significant
Figure in parenthesis are retransformed values, while outside are square root transformed values

The thrips population after 3 days of application revealed that in all the treatments thrips population reduced significantly over control. Seed treatment of thiamethoxam 30 FS @ 0.012% with spraying of spinosad 45 SC @ 0.018% was found most effective with 3.22 thrips per three terminal leaves per plant and found statistically at par with seed treatment of imidacloprid 600 FS @ 0.019% spraying of spinosad 45 SC @ 0.018% (3.35 thrips per three terminal leaves per plant), seed treatment of thiamethoxam 30 FS @ 0.012% with spraying of fipronil 5 SC @ 0.003% (3.42) and seed treatment of imidacloprid 600 FS @ 0.019% with spraying of fipronil 5 SC @ 0.003%(3.93). However, control recorded the highest 6.72 no. of thrips per three terminal leaves per plant. More or less same trends of efficacy were observed after 5, 7 and 10 days of application as well as pooled over second spray.

During present study it was found that descending chronological order of effectiveness of treatments base of no. of thrips per three terminal leaves per plant was thiamethoxam 30 FS + spinosad 45 % SC>imidacloprid 600 FS + spinosad 45 % SC >thiamethoxam 30 FS + fipronil 5 % SC >imidacloprid 600 FS + fipronil 5% SC >thiamethoxam 30 FS + spinetoram 11.7% SC >imidacloprid 600 FS + spinetoram 11.7% SC.

CONCLUSIONS

It can be concluded that among the six different insecticidal treatments, thiamethoxam 30 FS + spinosad 45 SC was somewhat costly but found most effective against thrips with lower no. of thrips (3.38 thrips per three terminal leaves per plant), maximum pod and haulm yield (3900 and 5560 kg/ha) with 69.57 and 72.67% increase over control and highest net realization (81360 Rs. /ha). Whereas, the treatments of imidacloprid 600 FS + spinosad 45 SC and thiamethoxam 30 FS + fipronil 5 SC were proved next best treatments.

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