The Journal of Phytopharmacology 2021; 10(6):506-509
Online at: www.phytopharmajournal.com

Research Article

ISSN 2320-480X
JPHYTO 2021; 10(6): 506-509
November- December
Received: 03-10-2021
Accepted: 15-11-2021

doi: 10.31254/phyto.2021.10613

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Bio-efficacy of insecticides against foliar thrips in summer groundnut

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ABSTRACT

Field experiments on Bio-efficacy of insecticides against foliar thrips (*Scirtothrips dorsalis*, *Caliothrips indicus* and *Frankliniella schultzei*) in summer groundnut was carried out at Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during consecutive three year i.e., 2017-18, 2018-19 and 2019-2020. All the treatments were significantly superior over untreated check. Results of the experiment after first spray showed that the lowest thrips population per trifoliate leaf was recorded in the treatment of clothianidin 50 WDG @ 20 g a.i./ha and it was statistically at par with spinosad 45 SC @ 67.5 g a.i./ha, imidacloprid 17.8 SL @ 24.9 g a.i./ha and dinotefuran 20 SG @ 30 g a.i./ha. The treatment of Beauveria bassiana (2 x 106 cfu/g), azadirectin 0.15 EC @ 3.75 g a.i./ha were fail to reduced thrips population. Considering the pod and haulm yield on hectare base, the treatment of clothianidin 50% WDG 0.004%, spinosad 45% SC 0.014%, imidacloprid 17.8% SL 0.005% and dinotefuran 20% SG 0.006% recorded significantly the highest pod and haulm. Looking to the ICBR, treatment of imidacloprid 17.8% SL 0.005% (1:7.42) showed the highest ICBR followed by the treatment of clothianidin 50% WDG 0.004% (1: 6.24) and dinotefuran 20% SG 0.006% (1:4.16)

Keywords: Groundnut, Thrips, Foliar thrips, Summer Groundnut, Bio efficacy.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.), an important oilseed and supplementary food crop of the world is attacked by more than 100 insect-pests right from planting stage to its storage (Nandagopal, 1992) [1]. The number of factors responsible for low productivity of groundnut includes adverse climatic conditions, poor quality seeds, diseases and insects which significantly affect both the quality and production of groundnut. Among these, insect pests are major limiting factor to reduce pod yield. As many as 52 species of insects and two species of mites have been recorded infecting the groundnut crop in India (Singh, et al., 1990) [2]. The sucking insect pests *viz*., aphid, *A. craccivora*, leafhoppers, *E. kerri*, whiteflies, *B. tabaci and* thrips, *T. dorsalis* are most important (Singh and Singh 1991) [3]. They suck the sap from tender parts of the plants, as a result plants wilted and dry up. Most of the species of sucking insects are also known to be vectors of diseases of groundnut. The Aphid, *A. craccivora* is a vector of groundnut rosette virus, peanut mottle virus and peanut stripe virus, cause yield losses up to 40 per cent (Khan and Hussain 1965) [4].

The chemical management of insect- pests is most practiced by the groundnut farmers for the management of this pest. There are number of newer insecticidal are available in market. Hence, it is necessary to find out effective insecticidal against sucking insect pest of groundnut.

MATERIALS AND METHODS

With a view to find out the effect of different insecticides against foliar thrips infesting in summer groundnut, a field experiment was conducted in randomized block design with three replications at Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during consecutive three year. Spraying of insecticides was applied after initiation of the pest population. The observations number of thrips per three terminal leaves was recorded from randomly selected five plants from each plot before 24 hours and at 3,7 & 10 days after spray. The second spray was applied at 10 days interval of first spray application. The observations of number of thrips /3 terminal leaves/plant and pod and haulm yield per plot were recorded. Data were subjected to ANOVA after following square root transformation.

RESULTS AND DISCUSSION

The thrips population was found non-significant before spray but after first and second spray, it was found significantly differ in all the treatments over control.

Pooled data of three years (2016-17, 2017-18 and 2018-19) after first spray (Table 1) showed that the

lowest thrips population per trifoliate leaf was recorded in the treatment of clothianidin 50 WDG @ 20 g a.i./ha (1.98 thrips/trifoliate leaf) and it was statistically at par with spinosad 45 SC @ 67.5 g a.i./ha (2.11 thrips/trifoliate leaf), imidacloprid 17.8 SL @ 24.9 g a.i./ha (2.27 thrips/trifoliate leaf) and dinotefuran 20 SG @ 30 g a.i./ha (2.64 thrips/trifoliate leaf). The next better treatments were acephate 75 SP @ 300 g a.i./ha and it showed 3.48 thrips per trifoliate leaf, while the treatment of *Beauveria bassiana* (2 x 10^6 cfu/g), azadirectin 0.15 EC @ 3.75 g a.i./ha were fail to reduced thrips population three days of first spray. More or less similar trend was also observed after seven and ten days of first spray.

The lowest thrips population (Table 1) was observed in treatments of clothianidin 50 WDG @ 20 g a.i./ha, spinosad 45 SC @ 67.5 g a.i./ha, imidacloprid 17.8 SL @ 24.9 g a.i./ha and dinotefuran 20 SG @ 30 g a.i./ha it showed 1.56, 1.73, 1.79 and 2.13 thrips/trifoliate leaf, respectively after three days of second spray. The highest thrips population was observed in treatments of Azadirectin 0.15 EC @ 3.75 g a.i./ha (5.37 thrips/trifoliate leaf) and *B. bassiana (*2 x 10^6 cfu/g) (5.63 thrips/trifoliate leaf). The treatment of clothianidin 50 WDG @ 20 g a.i./ha, spinosad 45 SC @ 67.5 g a.i./ha, imidacloprid 17.8 SL @ 24.9 g a.i./ha and dinotefuran 20 SG @ 30 g a.i./ha also prove effectiveness after seven and ten days of second spray it showed 1.22 & 0.73, 1.31 & 0.79, 1.38 & 0.81, 1.60 & 0.99 thrips population, respectively. The population of thrips was also decreased from three to ten days after spraying in every year.

The review on efficacy of different chemical insecticides against foliar thrips in summer groundnut was very scanty; however, the review available of another crop was discussed here. Subhash *et al.* [5] reported maximum per cent mean reduction of thrips population in imidacloprid (85.8 %), followed by acetamprid (79.6 %), thiamethoxam (66.6 %), dimethoate (65.0 %). In case of indigenous material, highest per cent reduction was observed in NSKE (54.9 %) in groundnut. Verma *et al.* [6] revealed that spray of imidacloprid @ 0.5 ml/lit resulted in minimum number of thrips (4.83 nymphs/ plant) and higher garlic bulb yield (172.49 q/ha). Kadam *et al.* [7] conducted experiment on bioefficacy of insecticides against thrips, *Scirtothrips dorsalis* (H.) infesting pomegranate fruits with five treatments. Among evaluated treatment spinosad @ 56.25 g a.i./ha was the most effective treatment (4.26 thrips/fruit) at 14 DAS and on par with fipronil @ 25 g a.i. ha-1 (4.42 thrips/fruit) followed by lambda cyhalothrin (6.35 thrips/fruit) and imidacloprid (6.37 thrips/fruit). Kharbade reported effectiveness of clothianidin, thiamethoxam, lambda-cyhalothrin and *M. anisopliae* against thrips and aphids on Bt cotton [8].

Seed yield and Economics

Considering the pod and haulm yield on hectare base (Table 2), the treatment of clothianidin 50% WDG 0.004% recorded significantly the highest pod and haulm yield (1446 & 1720 kg/ha), which was at par with the treatment of spinosad 45% SC 0.014% (1402 & 1706 kg/ha), imidacloprid 17.8% SL 0.005% (1370 & 1660 kg/ha) and dinotefuran 20% SG 0.006% (1371 & 1632 kg/ha). Looking to the ICBR, treatment of imidacloprid 17.8% SL 0.005% (1:7.42) showed the highest ICBR followed by the treatment of clothianidin 50% WDG 0.004% (1: 6.24) and dinotefuran 20% SG 0.006% (1:4.16).

CONCLUSION

Looking to the efficacy, yield and economics of the treatments clothianidin 50% WDG 0.004%, spinosad 45% SC 0.014%, imidacloprid 17.8% SL 0.005% and dinotefuran 20% SG 0.006% were found effective and economical insecticides for management of sucking pest of summer groundnut.

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HOW TO CITE THIS ARTICLE

Bhut JB, Bharadiya AM, Khanpara DV, Madariya RB. Bio-efficacy of insecticides against foliar thrips in summer groundnut. J Phytopharmacol 2021; 10(6):506-509. doi: 10.31254/phyto.2021.10613

Table 1: Bio efficacy of different insecticides against foliar thrips in groundnut

S. No.	Treatment	Number of thrips/3terminal leaf/plant							
		First spray				Second spray			
		BF	03 DAS**	07 DAS	10 DAS	BF	03 DAS	07 DAS	10 DAS
1	Dinotefuran 20 SG @ 30 g a.i./ha	2.74 (7.00)	1.77* (2.64)	1.57 (1.98)	1.63 (2.17)	1.63 (2.17)	1.61 (2.13)	1.45 (1.6)	1.22 (0.99)
2	Clothianidin 50 WDG @ 20 g a.i./ha	2.83 (7.51)	1.57 (1.98)	1.39 (1.44)	1.44 (1.57)	1.44 (1.57)	1.43 (1.56)	1.31 (1.22)	1.11 (0.73)
3	Spinosad 45 SC @ 67.5 g a.i./ha	2.86 (7.70)	1.61 (2.11)	1.46 (1.62)	1.48 (1.68)	1.48 (1.68)	1.49 (1.73)	1.35 (1.31)	1.13 (0.79)
4	*Beauveria bassiana* (2×10^6 cfu/g)	2.67 (6.62)	2.41 (5.32)	2.43 (5.41)	2.53 (5.89)	2.53 (5.89)	2.48 (5.63)	2.31 (4.83)	2.08 (3.84)
5	Imidacloprid 17.8 SL @ 24.9 g a.i./ha	2.87 (7.76)	1.66 (2.27)	1.48 (1.70)	1.59 (2.02)	1.59 (2.02)	1.51 (1.79)	1.37 (1.38)	1.15 (0.81)
6	Acephate 75 SP @ 300 g a.i./ha	2.70 (6.81)	1.99 (3.48)	1.83 (2.84)	1.81 (2.78)	1.81 (2.78)	1.83 (2.87)	1.66 (2.26)	1.43 (1.54)
7	Azadirectin 0.15 EC @ 3.75 g a.i./ha	2.93 (8.10)	2.50 (5.76)	2.55 (6.01)	2.55 (6.00)	2.55 (6.00)	2.50 (5.73)	2.32 (4.90)	2.17 (4.22)
8	Control	2.97 (8.29)	2.65 (6.52)	2.69 (6.74)	2.62 (6.38)	2.62 (6.38)	2.68 (6.69)	2.51 (5.79)	2.34 (5.00)
T	**S.Em.±**	**0.10**	**0.07**	**0.07**	**0.07**	**0.07**	**0.06**	**0.05**	**0.05**
	C.D. at 5 %	**NS**	**0.20**	**0.20**	**0.19**	**0.19**	**0.18**	**0.14**	**0.13**
Y x T	**S.Em.±**	**0.18**	**0.12**	**0.12**	**0.11**	**0.11**	**0.11**	**0.09**	**0.08**
	C.D. at 5 %	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
	C.V. %	**10.87**	**10.28**	**10.77**	**10.03**	**10.03**	**9.58**	**8.36**	**8.84**

* Square root ($\sqrt{x + 0.5}$) transformed value (The data in parenthesis are retransformed value)

** Pooled of three year, DAS = Days after spray, BF = Before spray

Table 2: Economics of insecticidal treatments against foliar thrips in groundnut

S. No.	Treatment	Yield (kg/ha)		Yield increased over control (kg/ha)		Additional income (Rs) (From column No.4)	Cost of treatment (Pesticides, labour charge etc.) (Rs. /ha)	Net realization (Rs)	ICBR
		Pod	Haulm	Pod	Haulm				
1	Dinotefuran 20 % SG	1371	1632	277	240	12034	2890	9144	1 : 4.16
2	Clothianidin 50% WDG	1446	1720	352	328	15398	2467	12932	1 : 6.24
3	Spinosad 45 % SC	1402	1706	308	313	13562	7200	6362	1 : 1.88
4	*Beauveria bassiana* (2 x 10^6 cfu/g)	1184	1465	91	73	3914	1900	2014	1 : 2.06
5	Imidacloprid 17.8 % SL	1370	1660	277	267	12132	1636	10496	1 : 7.42
6	Acephate 75% SP	1260	1513	166	121	7113	2072	5041	1 : 3.43
7	Azadirectin 0.15% W/W	1203	1500	110	108	4815	2900	1915	1 : 1.66
8	Control	1094	1392	--	--	--	--	--	--

Note:

1. Quantity of water**:** 500 l/ha
2. Price of Groundnut pod: Rs. 40/kg
3. Price of Groundnut haulm: Rs.4/kg
4. Labourer charges for spray: Rs. 500/spray