



MANAGEMENT OF SUCKING PESTS IN GROUNDNUT BY FOLIAR APPLICATION OF NEW INSECTICIDAL MOLECULES

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ABSTRACT

Field experiments were conducted to study the effect of certain insecticides against jassids, *Empoasca kerri* (Pruthi) and thrips, *Scirtothrips dorsalis* (Lindman) in groundnut at the Main Oilseeds Research Station, Junagadh during the summer seasons of 2011-13. Considering the efficacy and the cost benefit ratio, imidacloprid 200 SL 125 ml/ha, acephate 75 SP 500 gm/ha, dimethoate 30 EC 1000 ml/ha and thiamethoxam 25 WG 200 g/ha were most effective against the jassids and thrips population infesting groundnut crop. While, carbosulfan 25 EC 2000 ml/ha and triazophos 40 EC 1000 ml/ha were moderately effective against jassids and thrips. Acetamiprid 20 SP 100 g/ha and fipronil 80 WG 100 g/ha were noticed to be ineffective in checking the incidence of jassids and thrips. The highest pod yield (2554 kg/ha) with maximum ICBR (1:12.12) was recorded in the treatment of imidacloprid 200 SL 125 ml/ha.

Key words: *Scirtothrips dorsalis*, *Empoasca kerri*, Imidacloprid, Thiamethoxam, Groundnut

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a leading oilseed crop in India and an important crop of tropical and subtropical regions of the world. The seed (kernels) contains up to 50 per cent of a non drying oil, 40-50 per cent fat, 20-50 per cent protein and 10-20 per cent carbohydrate (Mehta, 2002). Though India ranks first in area under groundnut cultivation, the productivity is quite low compared to that of USA, China, Argentina and Indonesia (Anonymous, 2005). The reason for low productivity of groundnut is due to biotic and abiotic stresses during crop growth. Pests and diseases are the major biotic stresses for groundnut production. Groundnut crop is infested by about 90 species of insect pests. The sucking insect pest complex comprising thrips, *S. dorsalis* and leaf hoppers, *E. kerri* are the major pests of importance on groundnut crop specially when raised under summer conditions and bunch varieties are severely infested (David and Ramamurthy, 2011).

The incidence of thrips on groundnut crop has been increasing and is known to cause yield loss to the tune of 14 to 40 per cent (Ghewande, 1987). Nymphs and adults suck sap from the surface of the leaflets initially, resulting in white patches on the upper and necrotic patches on the lower surface of the leaves. When infestation is severe, leaf distortion causes stunted plant growth thus contributing directly towards yield reduction; besides, cause yield loss indirectly by

transmitting peanut bud necrosis virus disease. Leafhoppers suck the sap from the leaves and petioles and mainly it prefers the first three terminal leaves and feeding symptoms induce yellowing of foliage that begins at the tip, known as hopper burn (Khan and Hussain, 1965). Both these sucking pests showed certain levels of behavioral resistance to different classes of insecticides; hence, successful control of these pests is difficult. Keeping this in view, study was under taken to test the effectiveness of some newer molecules against these pests in groundnut.

MATERIAL AND METHODS

With a view to find out the effective and economical insecticides against sucking insect pests of groundnut, field experiments were carried out during summer seasons of 2011-13 at Main Oilseeds Research Station, Junagadh on groundnut variety GG-6. Nine treatments were tested in randomized Block Design with three replications. The crop was sown at the spacing of 30 cm x 10 cm having gross and net plot size was 5.0m x 2.4m and 4.0m x 1.8m, respectively. All recommended agronomical practices were followed to raise a healthy crop. First spray of insecticides was applied on the appearance of the pests. The second spray was applied after 15 days of first spray with help of manually operated knapsack sprayer. For observations, five plants were selected randomly from each plot and the jassids and thrips population was recorded 24 hours before and

Table 1. Bio-efficacy of insecticides against Jassids and thrips in groundnut after first and second spray (Pooled)

Treatments	First spray				Second Spray			
	Av No. of Jassids/3leaves/plant		Av No. of thrips/3leaves/plant		Av No. of Jassids/3leaves/plant		Av No. of thrips/3leaves/plant	
	3 DAS	7 DAS	3 DAS	7 DAS	3 DAS	7 DAS	3 DAS	7 DAS
Imidacloprid 200 SL 125 ml/ha	0.97* (0.44)	1.08 (0.67)	1.23 (1.01)	1.41 (1.49)	1.00 (0.50)	0.89 (0.29)	1.14 (0.80)	1.07 (0.64)
Acetamiprid 20 SP 100 g/ha	1.35 (1.32)	1.49 (1.72)	1.61 (2.09)	1.69 (2.36)	1.45 (1.60)	1.35 (1.32)	1.48 (1.69)	1.48 (1.69)
Thiamethoxam 25 WG 200 g/ha	1.25 (1.06)	1.37 (1.38)	1.14 (0.80)	1.32 (1.24)	1.19 (0.92)	1.15 (0.82)	1.03 (0.56)	1.03 (0.56)
Dimethoate 30 EC 1000 ml/ha	1.27 (1.11)	1.27 (1.11)	1.28 (1.14)	1.60 (2.06)	1.22 (0.99)	1.12 (0.75)	1.22 (0.99)	1.34 (1.30)
Carbosulfan 25 EC 2000 ml/ha	1.14 (0.80)	1.16 (0.85)	1.29 (1.16)	1.51 (1.78)	1.13 (0.78)	1.01 (0.52)	1.25 (1.06)	1.22 (0.99)
Fipronyl 80 WG 100 g/ha	1.21 (0.96)	1.29 (1.16)	1.17 (0.87)	1.37 (1.38)	1.21 (0.96)	1.16 (0.85)	1.10 (0.71)	1.03 (0.56)
Triazophos 40 EC 1000 ml/ha	1.32 (1.24)	1.41 (1.49)	1.32 (1.24)	1.54 (1.87)	1.31 (1.22)	1.27 (1.11)	1.30 (1.19)	1.22 (0.99)
Acephate 75 SP 500 g/ha	1.09 (0.69)	1.14 (0.80)	1.35 (1.32)	1.43 (1.54)	1.10 (0.71)	1.00 (0.50)	1.29 (1.16)	1.10 (0.71)
Control	1.58 (2.00)	1.68 (2.32)	1.88 (3.03)	1.99 (3.46)	1.68 (2.32)	1.55 (1.90)	1.71 (2.42)	1.59 (2.03)
TS.	0.04	0.06	0.07	0.07	0.08	0.09	0.04	0.04
YX T	0.10	0.18	0.21	0.20	0.25	0.28	0.11	0.11
	0.06	0.08	0.06	0.08	0.07	0.06	0.07	0.07
	NS	0.21	0.17	0.22	0.20	0.17	NS	NS
	8.73	9.87	7.80	8.72	9.77	8.72	8.81	9.35

* Square root transformed value, Numerals in parentheses are retransformed value

Table 2. Economics of insecticidal treatments against sucking pests in summer groundnut

Treatment	Quantity of insecticide g or ml/ha	Cost of insecticide Rs/ha	Cost of treatment with labour charges (Rs/ha)	Pod yield (kg/ha)	Increase in pod yield over control (kg/ha)	Haulm yield (kg/ha)	Increase in haulm yield over control (kg/ha)	Realization over control (Rs/ha)	Net return (Rs/ha)	CBR
Imidacloprid 200 SL 125 ml/ha	250 ml	550	1110	2554	300	4140	726	13452	12342	1 : 12.12
Acetamiprid 20 SP 100 g/ha	200 g	260	820	2291	37	3532	118	1716	896	1 : 2.09
Thiamethoxam 25 WG 200 g/ha	400 g	1360	1920	2540	286	4077	663	12766	10846	1 : 6.65
Dimethoate 30 EC 1000 ml/ha	1000 ml	320	880	2438	184	3765	351	8062	7182	1 : 9.16
Carbosulfan 25 EC 2000 ml/ha	2000 ml	1350	1910	2478	224	3947	533	10026	8116	1 : 5.25
Fipronil 80 WG 100 g/ha	200 g	3000	3560	2294	40	3467	53	1706	-1854	1 : 0.48
Triazophos 40 EC 1000 ml/ha	2000 ml	1040	1600	2424	170	3715	301	7402	5802	1 : 4.63
Accephate 75 SP 500 g/ha	1000 g	510	1070	2492	238	3949	535	10590	9520	1 : 9.90
Control	-	-	-	2254	-	3414	-	-	-	-

3 and 7 days after each spraying from 3 leaves per plant. The economics of different treatments were worked out based on the pod and haulm yield and cost of protection. Based on the cost of cultivation and the gross profit in different treatments, the CBR and net profit was calculated.

RESULTS AND DISCUSSION

Efficacy of insecticides against jassids. Pooled data (Table 1) indicate that significantly low population of jassids (0.44 jassids/3 leaves/plant) was recorded in the treatment of imidacloprid 200 SL 125 ml/ha after 3 days of spray. The remaining treatments viz., acephate 75 SP 500 gm/ha, carbosulfan 25 EC 2000 ml/ha, fipronil 80 WG 100 g/ha, thiamethoxam 25 WG 200 g/ha, dimethoate 30 EC 1000 ml/ha, triazophos 40 EC 1000 ml/ha and acetamiprid 20 SP 100 g/ha were also effective in reduction of jassid population after 3 days of spray. Maximum jassid population (2.00 jassids/3 leaves/plant) was recorded in control. Similarly, significantly low population of jassids (0.67 jassid/3 leaves/plant) was recorded in the treatment of imidacloprid 200 SL 125 ml/ha after 7 days of spray and it was at par with the treatments of acephate 75 SP 500 gm/ha and carbosulfan 25 EC 2000 ml/ha. The maximum jassid population (2.32 jassid/3 leaves/plant) was recorded in control. More or less similar trend was observed after 2nd spray for both pests.

Efficacy of insecticides against thrips. Pooled data (Table 1) indicate that significantly low population of thrips (0.80 thrips/3 leaves/plant) was recorded in the treatment of thiamethoxam 25 WG 200 g/ha and it was at par with fipronil 80 WG 100 g/ha, imidacloprid 200 SL 125 ml/ha, dimethoate 30 EC 1000 ml/ha, carbosulfan 25 EC 2000 ml/ha and triazophos 40 EC 1000 ml/ha after 3 days of spray. The maximum population of thrips (3.03 thrips/3 leaves/plant) was recorded in control. Similarly after 7 days of treatment, significantly low population of thrips (1.24 thrips/3 leaves/plant) was recorded in the treatment of thiamethoxam 25 WG 200 g/ha and it was at par with the treatments viz., fipronil 80 WG 100 g/ha, imidacloprid 200 SL 125 ml/ha, acephate 75 SP 500 g/ha and carbosulfan 25 EC 2000 ml/ha.

Yield and economics. Pooled pod and haulm yield data (Table 2) indicate that all the treatments except fipronil 80 WG 100 g/ha and acetamiprid 20 SP 100 g/ha gave significantly the highest pod and haulm yield over control. However, significantly, highest pod yield (2554 kg/ha) and haulm yield (4140 kg/ha) were recorded in the treatment of imidacloprid 200 SL 125 ml/ha that was at par with the treatments viz., thiamethoxam 25 WG 200 g/ha (2540 kg/ha and 4077 kg/ha, respectively), acephate 75 SP 500 g/ha (2492 kg/ha and 3949 kg/ha,

respectively) and carbosulfan 25 EC 2000 ml/ha (2478 kg/ha and 3937 kg/ha, respectively). The lowest pod and haulm yield were recorded in the control. The highest net returns was obtained in the treatment of imidacloprid 200 SL 125 ml/ha (Rs. 12342) followed by thiamethoxam 25 WG 200 g/ha (Rs. 10846), acephate 75 SP 500 g/ha (Rs. 9520), carbosulfan 25 EC 2000 ml/ha (Rs. 8116), dimethoate 30 EC 1000 ml/ha (Rs. 7182), triazophos 40 EC 1000 ml/ha (Rs. 5802), acetamiprid 20 SP 100 g/ha (Rs. 896) and fipronil 80 WG 100 g/ha (Rs. -1854).

Application of imidacloprid 200 SL 125 ml/ha proved economically most viable with maximum ICBR (1:12.12) followed by acephate 75 SP 500 g/ha (1:9.90), dimethoate 30 EC 1000 ml/ha (1:9.16), thiamethoxam 25 WG 200 g/ha (1:6.65), carbosulfan 25 EC 2000 ml/ha (1:5.25), triazophos 40 EC 1000 ml/ha (1:4.63), acetamiprid 20 SP 100 g/ha (1:2.09) and fipronil 80 WG 100 g/ha (1:0.48). Similar findings by Saradava (2004), Venkanna et al (2010) and Karena (2012) indicate that imidacloprid 0.005 per cent or thiamethoxam 0.05 per cent proved the most effective against jassid and thrips in groundnut.

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