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Bioefficacy of imidacloprid against thrips and aphids on groundnut, *Arachis hypogaea* L.

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Abstract : Bioefficacy of imidacloprid 200 SL was evaluated against thrips and aphids on groundnut during kharif 1998 and rabi 1998. Imidacloprid 200 SL at doses 100, 150, 200 and 250 ml ha were tested against these pests with dimethoate and methyl-o-demeton at 500 ml ha^{-1} as standards. Imidacloprid at 100 ml ha^{-1} effectively checked the population of thrips and aphids on groundnut and was superior to the standard chemicals. The effect of imidacloprid spray persisted for three weeks. (***Key Words*** : *Arachis hypogaea, Bioefficacy, Aphids, Thrips, Imidacloprid).*

The thrips *Scirtothrips dorsalis* Hood *Caliothrips indicus* Bagnall *Frankliniella schultzei* Trybom and aphids *Aphis craccivora* Koch are the major sucking pests in groundnut which cause a substantial yield loss. Nymphs and adults of the thrips suck sap from the surface of leaflets which results in white patches on the upper surface and necrotic patches on the corresponding lower surface of the leaves. Aphid nymphs and adults suck sap from the tender growing shoots, flowers and pegs, causing stunting and distortion of the foliage and stems. Amin (1984) reported that the sucking pests *viz.*, thrips, leaf hoppers and aphids alone caused an economic loss of 10-30 per cent, in groundnut and the yield loss due to thrips and leaf hoppers was estimated at 48.5 per cent in Tamil Nadu (Sivasubramaniyan and Palanisamy, 1986). The present study was undertaken to evaluate the bioefficacy of imidacloprid, a new insecticide molecule of chloronicotinyl group against the thrips and aphids on groundnut.

Materials and Methods

Two field experiments were conducted in the major groundnut growing areas of Tamil Nadu to evaluate the bioefficacy of imidacloprid, one each against thrips and aphids on groundnut.

The first field experiment was conducted during kharif 1998 (July-October) at Regional Research Station, Vridhachalam with cv. Co2 in irrigated condition for evaluating the bioefficacy against thrips. The experiment was laid out in randomised block design in 4 x 5 m plots with seven treatments and four replications. The treatments were imposed at 30 days after sowing (DAS) when the pest was noticed and repeated at 51 DAS, using a high volume knapsack sprayer with 500 l ha^{-1} of spray fluid.

The population of thrips was recorded from two leaves per plant (third and fifth leaf from the top of the main branch) in five plants per plot selected at random, leaving the border rows. The observations were recorded before the treatment and at 3, 7, 14 and 21 days after treatment (DAT).

The second field experiment was conducted during rabi 1998 (October - January) at Regional Research Station, Aliyarnagar with cv. Co2 for evaluating the bioefficacy of imidacloprid against aphids on groundnut. The crop was sown in 5 x 4 m plots using 30 x 10 cm spacing. The experiment was laid out in randomised block design with four replication adopting the same treatments as in the previous field experiment. Observations on aphids was made in five plants per plot by recording number of aphids in the terminal shoots before treatment and 3, 7, 14 and 21 DAT.

Results and Discussion

In the first field experiment conducted during kharif 1998, incidence of thrips was noticed two weeks after sowing. The population ranged from 29.75 to 34.50 / 10 leaves before the treatment and at 3 DAT the population of thrips was significantly reduced to a level of 0.00 to 0.75 / 10 leaves in imidacloprid treatments, while it was 3.75 and 3.00 / 10 leaves in the standards dimethoate and methyl-o-demeton respectively (Table 1). Imidacloprid at all the doses were superior to the standard chemicals in the observations recorded at 7, 14 and 21 DAT and the effect of imidacloprid treatment persisted for 21 days. A similar trend in thrips population reduction was noticed after the second round of treatments also.

In the second field experiment conducted during rabi 1998, incidence of aphids was noticed during the third week after sowing and the population of aphids ranged from 34.35 to 40.25 / plant prior to

Table 1. Effect of imidacloprid 200 SL foliar application against thrips on groundnut.
Number of thrips / 10 leaves(Mean of 4 observations)

Sl. No.	Treatments	Days after treatment								
		First spray					Second Spray			
		Before treatment	3	7	14	21	3	7	14	21
1.	Imidacloprid 200 SL @ 100 ml ha^{-1}	31.50 (5.66)	0.75 $(1.06)^{a}$	3.00 $(3.12)^{c}$	9.25 $(3.90)^{bc}$	14.75 $(1.06)^{bc}$	0.75 $(1.06)^{a}$	3.25 $(1.92)^{b}$	8.50 $(2.98)^{b}$	13.25 $(3.70)^{b}$
2.	Imidacloprid 200 SL @ 150 ml ha^{-1}	32.25 (5.72)	0.75 $(1.06)^{a}$	2.75 $(1.79)^{a}$	8.50 $(3.99)^{bc}$	16.50 $(4.12)^{c}$	0.50 $(0.93)^{a}$	2.75 $(1.79)^{ab}$	7.25 $(2.77)^{ab}$	11.00 $(3.38)^{a}$
3.	Imidacloprid 200 SL @ 200 ml ha^{-1}	34.50 (5.91)	00.00 $(0.71)^{a}$	2.25 $(1.64)^{a}$	6.75 $(2.68)^{a}$	13.50 $(3.73)^{ab}$	0.25 $(0.84)^{a}$	2.25 $(1.64)^{ab}$	6.50 $(2.64)^{a}$	11.25 $(3.42)^{a}$
4.	Imidacloprid 200 SL @ 250 ml ha^{-1}	31.50 (5.66)	0.25 $(0.84)^{a}$	2.25 $(1.65)^{a}$	7.00 $(2.74)^{ab}$	11.50 $(3.46)^{a}$	0.00 $(0.71)^{a}$	1.75 $(1.49)^{a}$	6.25 $(2.59)^{a}$	10.75 $(3.35)^{a}$
5.	Dimethoate 35 EC @ 500 ml ha^{-1}	29.75 (5.49)	3.75 $(2.05)^{a}$	12.50 $(3.60)^{c}$	19.50 $(4.47)^{e}$	24.25 $(4.97)^{d}$	3.50 $(1.98)^{b}$	9.00 $(3.08)^{c}$	15.75 $(4.03)^{d}$	17.50 $(4.24)^{c}$
6.	Methyl-o-demeton 25 EC @ 500 ml ha^{-1}	31.00 (5.49)	3.00 $(2.05)^{b}$	9.75 $(3.19)^{b}$	14.50 $(3.87)^{d}$	21.00 $(4.63)^{d}$	2.75 $(1.79)^{d}$	7.25 $(2.77)^{c}$	12.50 $(3.60)^{c}$	14.75 $(3.90)^{b}$
7.	Untreated check	30.25 (5.54)	30.50 $(5.57)^{c}$	24.75 $(5.02)^{d}$	27.00 $(5.24)^{f}$	23.50 $(4.89)^{d}$	21.50 $(4.69)^{c}$	20.25 $(4.55)^{d}$	18.50 $(4.35)^{d}$	21.25 $(4.66)^{d}$

In a column means followed by a common letter are not significantly different by DMRT (P=0.05)
Values in parentheses are transformed values, $\sqrt{x+0.5}$

Table 2. Effect of imidacloprid 200 SL foliar application against aphids on groundnut. Number of aphids / plant (Mean of 4 observations)

Sl. No.	Treatments	Days after treatment								
		First spray					Second Spray			
		Before treatment	3	7	14	21	3	7	14	21
1.	Imidacloprid 200 SL @ 100 ml ha^{-1}	34.35 (5.89)	1.30 $(1.34)^{b}$	3.00 $(1.86)^{b}$	6.80 $(2.69)^{a}$	10.75 $(3.35)^{b}$	0.90 $(1.18)^{b}$	5.60 $(2.47)^{b}$	8.70 $(3.03)^{b}$	10.45 $(3.30)^{c}$
2.	Imidacloprid 200 SL @ 150 ml ha^{-1}	40.25 (6.38)	0.60 $(1.05)^{a}$	3.20 $(1.92)^{b}$	8.25 $(2.96)^{b}$	10.30 $(3.28)^{b}$	0.70 $(1.09)^{b}$	3.20 $(1.92)^{a}$	7.10 $(2.76)^{b}$	11.80 $(3.50)^{cd}$
3.	Imidacloprid 200 SL @ 200 ml ha^{-1}	35.35 (5.99)	1.50 $(1.41)^{b}$	2.30 $(1.67)^{a}$	5.95 $(2.53)^{a}$	8.45 $(2.99)^{a}$	0.90 $(1.18)^{b}$	2.90 $(1.84)^{a}$	5.60 $(2.47)^{a}$	8.60 $(3.01)^{b}$
4.	Imidacloprid 200 SL @ 250 ml ha^{-1}	36.10 (6.04)	1.75 $(1.49)^{b}$	3.10 $(1.89)^{b}$	6.35 $(2.62)^{a}$	7.40 $(2.81)^{a}$	0.00 $(0.71)^{a}$	2.85 $(1.82)^{a}$	5.40 $(2.43)^{a}$	6.25 $(2.59)^{a}$
5.	Dimethoate 35 EC @ 500 ml ha^{-1}	39.75 (6.34)	3.00 $(1.87)^{c}$	7.40 $(2.80)^{d}$	11.30 $(3.43)^{c}$	16.80 $(4.15)^{d}$	4.10 $(2.14)^{b}$	11.40 $(3.45)^{d}$	14.25 $(3.83)^{d}$	15.20 $(3.96)^{c}$
6.	Methyl-o-demeton 25 EC @ 500 ml ha^{-1}	34.90 (5.95)	1.50 $(1.49)^{b}$	5.40 $(2.42)^{c}$	10.80 $(3.43)^{c}$	14.20 $(3.83)^{c}$	3.20 $(1.92)^{c}$	8.60 $(3.01)^{c}$	11.65 $(3.49)^{c}$	12.30 $(3.57)^{d}$
7.	Untreated check	38.50 (6.24)	31.35 $(5.63)^{d}$	18.90 $(4.40)^{e}$	23.65 $(4.91)^{f}$	24.80 $(5.03)^{e}$	21.65 $(4.70)^{e}$	19.40 $(4.46)^{e}$	17.45 $(4.24)^{e}$	18.65 $(4.37)^{f}$

In a column means followed by a common letter are not significantly different by DMRT (P=0.05)

Values in parentheses are transformed values, $\sqrt{x+0.5}$

application of the treatments. At 3 DAT, a significant reduction in aphid population was noticed in all the treatments, the lowest being 0.60/plant in imidacloprid at 150 ml ha^{-1}. Imidacloprid treatments were superior to the standard chemicals even at a lower dose of 100 ml ha^{-1} in the observations recorded at 7, 14 and 21 DAT and at 21 DAT the plant infestation ranged from 3.67 to 5.60 per cent in imidacloprid treatments while it was 12.67 per cent in the untreated check. Similar reduction in aphid population was noticed after the second round of treatments also.

Bioefficacy of imidacloprid against thrips and aphids was reported by earlier workers in the crops like cotton, chilli, tomato, tobacco, banana etc., In chilli, Jarande and Dethe (1994) reported that seed dressing with 15 g imidacloprid 70WS per kg of seed followed by root dip of seedlings with 0.03 per cent imidacloprid 200 SL reduced the population of thrips.

Imidacloprid foliar spray at 0.017 to 0.034 g a.i./plant effectively checked the damson hop aphid *Phorodon humuli* (Schrank) (Martin *et al.* 1992) and a similar result was reported in potato against the resistant strains of *Myzus persicae* (Sulz.) (Woodford, 1992). Treverrow (1996) found that stem injection of imidacloprid in banana kept the plant free from *Pentalonia nigronervosa* Coq. for 40 days after treatment. In cotton, Kumar (1998) reported that foliar application of imidacloprid 200 SL at 100 ml ha effectively reduced the population of sucking pests *viz.*, thrips and aphids and the effect of spray persisted for three weeks.

The present findings from the two field experiments are in conformity with the results of the earlier workers and it is concluded that imidacloprid 200 SL at 100 ml ha^{-1} is sufficient to check the population of thrips and aphids on groundnut.

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