

RESEARCH ARTICLE

Evaluation of insecticides for the management of scale insect in mango (*Mangifera indica*)

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ABSTRACT

The mango scales, though a minor pest earlier, are gaining importance in the recent years infesting the leaves and fruits in mango. Four species of scale insects which include *Aulacaspis tubercularis*, *Aspidiotus destructor*, *Ceroplastis rubens* and *Aonidiella aurantii* were present in the mango ecosystem of which *Aulacaspis tubercularis* and *Aspidiotus destructor* were most commonly observed species at Fruit Research Station, Sangareddy. Scales were generally found on the upper or lower surface of leaves and also on fruits. Both the species attack and injure the older leaves and the attack on new flush is rarely seen. Scales not only affect the quantity but also quality of the mango fruit by causing blemishes on the fruits affecting the commercial value of the fruit and also their export potential. Hence a field experiment was conducted at Fruit Research Station, Sangareddy on mango var. Mahmooda Vikarabad to evaluate certain insecticides against mango scales (Homoptera: Diaspididae) during 2008-09 and 2009-10. Two sprays of Methyl parathion @ 2ml/l at 15 days interval and Acephate 75WP @ 1.5g/l and the spray of Imidacloprid @ 0.3 ml/l at 15 days after the first spray was found to be significantly superior to other treatments in management of scale insects in mango.

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INTRODUCTION

Mango is attacked by a number of sucking pests and borers. Scale insects are becoming a major problem in poorly managed orchards especially in old trees in the recent years. De Villiers (1998) reported two species of mango scales, *Aulacaspis tubercularis* and *Aspidiotus destructor* as a major problem on mango especially on late mango cultivars. Mango scales are present throughout the year with overlapping generations. Scale infested areas on leaves turn pale green or yellow and ultimately die. Heavy infestation can kill leaves and branches. Little information is available on the chemical options for managing this pest. In view of this the present investigation was taken up to study the efficacy of different insecticides on scale insects on mango.

MATERIAL AND METHODS

To evaluate the efficacy of different insecticides against scale insect, field experiments were carried out at Fruit Research Station, Sangareddy during 2008-09 and 2009-10 on mango var. Mahmooda Vikarabad with nine treatments in a Randomized Block Design with three trees each, one tree taken as one replication.

The following nine treatments were imposed in the month of February including T₁: Spraying of acephate 75 WP@1g/l alone followed by Imidacloprid 200SI 15 days later, T₂: Spraying of acephate 0.5g/l + Dichlorvos @ 1ml twice at 15 days interval, T₃: Malathion 50 EC @ 2ml/l two sprays at 15 days interval, T₄: Spraying of Neem oil @ 5ml/l two sprays at 15 days interval T₅: Spraying of Dichlorvos@1ml/per l alone –

2sprays at 15 days interval, T₆: Spraying of Methyl parathion 1ml/l – 2 sprays at 15 days interval, T₇: Profenophos 1.5ml/l – 2 sprays at 15 days interval, T₈: NSKE 5 per cent 2 sprays, T₉: Untreated control (water spray). The orchard was kept clean and affected branches were pruned after harvest in all the treatments.

Twenty leaves were randomly selected from each tree and observed for incidence of scales. The presence of scales was evaluated by giving a score to the leaves from 0-5 with 0 as no scale marks and 5 as full of mango scales. The following formula was used to calculate the per cent damage index of mango leaf :

$$\frac{\{\text{Class}(0 \times 0) + \text{Class}(1 \times 1) + \text{Class}(2 \times 2) + \text{Class}(3 \times 3) + \text{Class}(4 \times 4) + \text{Class}(5 \times 5)\}}{\text{(number of classes)} \times \text{(number of observations 1)}}$$

Data on pre-spray count of scales on infested and healthy leaves and post spray recording of the same were collected on treated trees and untreated control after first and second sprays. The data were subjected to statistical analysis.

RESULTS AND DISCUSSION

The two most abundant species of scales found at FRS, Sangareddy in the var. Mahmooda Vikarabad were *Aulacaspis tubercularis* and *Aspidiotus destructor*. Besides these species, pink wax scale, *Ceroplastes rubens* were also observed in insignificant numbers. It was observed and recorded that the scale population increased from May to August in both the years (2008-09 and 2009-10). Scale population was mostly

on the old leaves and rarely on the new flush.

During 2008-09, Acephate75 WP@1g/l alone followed by imidacloprid @0.3ml/l 15 days later, acephate 0.5g/l + Dichlorvas @1ml, Malathion 50 EC @ 2ml/l 2 sprays at 15 days interval, Dichlorvas @1ml /per l alone – 2 sprays at 15 days interval, Methyl parathion 1ml/l – 2 sprays at 15 days interval were effective in management of scales after first spray 35.83,37.16,35.87,36.08 and 37.58 per cent pest incidence, respectively in comparison to control. After second spray the pest incidence was low in T₁ (19.02) and T₆ (19.31) and the per cent reduction over control was 52.33 and 51.60, respectively and was statistically superior over other treatments (Table 1).

During 2009-10 pre-spray count of mango scales indicated that the pest population was uniformly distributed without any significant difference. After the first spray all the seven treatments were superior over the control. Among all the treatments, spraying of Methyl Parathion @ 1ml/l, two sprays at an interval of 15 days and Acephate @1g/l followed by spraying of Imidacloprid @ 0.3ml/l 15 days later with 58.7 and 58.6 per cent damage index, respectively were found effective in management of scales in mango after the first spray. After the second spray T₁ (71.9%) and T₆ (72.3%) were found to be effective in recording high per cent reduction over control (Table 2). However, the treatments T₂, T₃ and T₅ were also superior over control with 60.4, 58.03 and 63.06 per cent reduction over control, respectively. T₇ though superior over control was least effective among the tested treatments.

Handa *et al.* (1999) reported that Fenvalrate was most effective in management of scales to an extent of 85.3 per

Table 1 : Efficacy of different insecticides on scale insects in mango during 2008-09 at Fruit Research Station, Sangareddy

Sr. No.	Treatments	Pre spray count	Per cent pest incidence after I spray	Per cent reduction over control after I spray	Per cent pest incidence after II spray	Per cent reduction over control after II spray
1.	Acephate75 WP@1g/l alone followed by imidacloprid @ 0.3ml/Lit 15 days later	35.83 (6.07)	23.48 (4.89)a	36.52 (37.17)a	19.02 (4.41) a	52.33 (46.32)a
2.	Acephate 0.5g/l + Dichlorvas @1ml	37.16 (6.13)	26.18 (5.16)a	29.23 (32.77)c	20.79 (4.61) a	47.89 (43.74)b
3.	Malathion 50 EC @ 2ml/l 2 sprays at 15 days interval	35.87 (6.03)	28.20 (5.35)a	23.84 (29.20)d	25.87 (5.13) c	35.16 (36.33)c
4.	Neem oil @5ml/l 2 sprays at 15 days interval	36.34 (6.06)	29.73 (5.49)b	19.81 (26.35)f	31.53 (5.65) e	20.97 (27.20)d
5.	Dichlorvas @1ml /per lit alone – 2 sprays at 15 days interval	36.08 (6.04)	24.38 (4.98)a	34.18 (35.73)b	21.18 (4.65) b	46.91 (43.22)b
6.	Methyl parathion 1ml/l – 2 sprays at 15 days interval	37.58 (6.17)	22.74 (4.82)a	40.30 (39.35)a	19.31 (4.45) a	51.60 (45.92)a
7.	(Profenophos 1.5ml/l – 2 sprays at 15 days interval)	38.55 (6.24)	29.14 (5.45)b	21.30 (27.49)e	27.18 (5.26) d	31.87 (34.33)c
	Control	36.33 (6.06)	37.03 (6.12)c	–	39.90 (6.35)f	–
	SEM ±	0.052	3.04	1.53	0.669	2.109
	C.D. (P=0.05)	NS	6.3	4.74	1.5	6.49
	CV%	1.5	12.8	9.1	11.8	9.0

Values in parenthesis are transformed values

Table 2 : Efficacy of different insecticides on scale insects in mango during 2009-10 at Fruit Research Station, Sangareddy

Sr. No.	Treatments/Conc.	Pres pray count	Pest incidence after I spray	Per cent reduction over control	Pest incidence after II spray	Per cent reduction over control
1.	T ₁ Acephate75 WP@ 1g/l alone followed by imidacloprid @0.3ml/Lit 15 days later	41.54 (6.48)	17.30 (4.21)a	58.6 (49.97)a	12.63 (3.62) a	71.9 (58.06)a
2.	T ₂ Acephate 0.5g/l + Dichlorvas @ 1ml	40.41 (6.39)	22.61 (4.80)a	45.9 (42.63)b	16.63 (4.13)b	60.4 (51.02)b
3.	T ₃ Malathion 50 EC @ 2ml/l 2 sprays at 15 days interval	40.56 (6.40)	21.16 (4.65)a	49.0 (44.39)b	19.95 (4.52)c	58.03 (49.68)b
4.	T ₄ Neem oil @5ml/l 2 sprays at 15 days interval	40.32 (6.40)	33.19 (5.80)c	20.6 (26.84)d	31.20 (5.63) e	30.51 (33.47)d
5.	T ₅ Dichlorvas @1ml /per lit alone-2 sprays at 15 days interval	41.66 (6.49)	20.96 (4.63)a	49.9 (44.98)b	19.00 (4.41) c	63.06 (52.06)b
6.	T ₆ Methyl parathion 1ml/l – 2 sprays at 15 days interval	40.43 (6.39)	17.10 (4.19)a	58.7 (50.08)a	12.30 (3.57) a	72.3 (58.30)a
7.	T ₇ (Profenophos 1.5ml/l –2 sprays at 15 days interval)	40.51 (6.40)	25.53 (5.10)b	38.3 (38.16)c	22.30 (4.77) d	49.86 (44.93)c
8.	T ₈ (Control)	41.75 (6.44)	41.78 (6.50)d	-	44.79 (6.72)f	-
	SEM ±	0.044	1.872	2.674	1.547	2.193
	C.D. (P=0.05)	NS	5.61	8.109	4.63	6.65
	CV%	1.2	12.8	11.2	11.8	7.9

Values in parenthesis are transformed values

cent. The early stages of scales were effectively controlled with the sprays of Dimethoate, fish oil rosin soap, Monocrotophos, Neem oil, Quinolphos, Methyl demeton (Mani and Krishnamurthy, 2001). Chlorpyrifos @ 64g/100 l and 12g/100 l was effective in controlling mango scales. Legadec *et al.* (2005) reported that Thiomethoxam application at the point of drip irrigation was most effective for the control of scale insects and mealy bugs on mangos in South Africa.

Conclusion :

Among all the treatments spraying of Methyl parathion @ 1ml/l, two sprays at an interval of 15 days and Acephate @ 1g/l followed by spraying of Imidacloprid @ 0.3ml/l 15 days

later were found effective in management of scales in mango.

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