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EFFICACY OF SYNTHETIC INSECTICIDES AND BIOPESTICIDES AGAINST THRIPS ON MOTHBEAN

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ABSTRACT

The efficacy of synthetic insecticides and biopesticides was evaluated against the thrips inpesting mothbean in a field trial conduded at SKN college of Agriculture, Jobner during *kharif* 2003 & 2007. Out of nine treatments evaluated, methyl demeton (0.025%) proved most effective against thrips followed by dimethoate (0.03%) and monocrotophos (0.036%). The treatment of *karanj* seed extract (5%) proved least effective followed by NSKE (5%) and nimbecidine (5 ml^{-1}); whereas, acephate (0.037%), imidacloprid (0.002%) and *M. anisopliae* (2×10^5 spores l^{-1}) were of middle order of effectiveness. The maximum yield of 6.17 q/ha was obtained in the treatment of monocrotophos (0.036%).

Key words: Efficacy, treatments, *Caliothrips indicus, Vigna aconitifolia*

INTRODUCTION

Mothbean, *Vigna aconitifolia* (Jacq.) Marechal is an important pulse crop well suited for arid and semi-arid regions in India. At the national level, Rajasthan state enjoys the privilege of being at the top in its production contributing about 75-80 per cent of the total national production. The green as well as dry plants make good quality fodder and is used as green manure that improves soil fertility. The crop is damaged at various stages of plant growth by a number of insect pests, such as white grub, *Holotrichia consanguinea*; termite, *Odontotermes obesus*; jassid, *Empoasca motti*; whitefly, *Bemisia tabaci*; galerucid beetle, *Madursia obscurella*; thrips, *Caliothrips indicus*; stem fly, *Ophiomyia phaseoli*; red hairy caterpillar, *Amsacta moorei*; flea beetle, *Phyllotreta cruciferae* and pod borer, *Catechrysops cnejus* (Bindra and Singh, 1969; Satyavir, 1980 and Pareek *et al.*, 1983).

MATERIALS AND METHODS

The filed trial to evaluate synthetic and biopesticides against the thrips was laid out in a randomized block design with ten treatments including control, each replicated thrice. Mothbean (variety, RMO-40) was sown in the field on 20th July and 23 July in *kharif* 2003 and 2004, respectively, in the plots measuring 2.40×3.00 m^2 keeping 30 cm and 15 cm row to row and plant to plant distance, respectively.

The insecticidal treatments were dimethoate 30 EC (0.03%), monocrotophos 36 SL (0.036%), methyl demeton 25 EC (0.025%), acephate 75 WP (0.037%), neem seed kernel extract (5%), nimbecidine 0.03 EC (5 ml/litre), *Pongamia glabra* seed extract (5%), imidacloprid 17.8 EC (0.002%) and *Metarrhizium anisopliae* @ 2×10^5 spores/litre. The quantum of spray solution used for spraying the crop was 600 1 ha^{-1}. The observations for population of thrips was recorded one day before and 1, 3, 7 and 15 days after the application of insecticides. The analysis of variance was carried out after transforming the percentage reduction data into angular transformed values. The crop was harvested when pods attained full maturity. The harvested plants of each plot were kept separately and sun dried. The dried plants were threshed manually and seed yield per plant was computed and after statistical analysis expressed on a per hectare basis.

RESULTS AND DISCUSSION

The pooled data presented in Tables (1) and (2) for the year 2003 and 2004 indicated that all the insecticidal treatments reduced the thrips population significantly over the untreated control. However, the significant difference that existed among treatments was more pronounced after second spray than the first. The overall efficacy of insecticidal treatments during both the years at 1, 3, 7 and 15 days intervals against, *C. indicus* revealed that maximum population reduetion was observed with the treatment of methyl demeton (0.025%) followed by dimethoate (0.03%) and monocrotophos (0.036%). The treatment of acephate (0.037%), imidacloprid (0.002%) and *M. anisopliae* (2×10^5 spores l–1) existed in middle order of effectiveness. The

Table 1. Efficacy of insecticides against thrips, *C. indicus* on mothbean, *V. aconitifolia* at one and three days interval (Pooled mean, *Kharif*, 2003 and 2004)

S.No.	Treatments	Dose Concentration	Mean per cent reduction in thrips population after one days			Mean per cent reduction in thrips population after three days		
			1st spray	2nd spray	Mean	1st spray	2nd spray	Mean
1.	Dimethoate 30 EC	0.03%	79.35 (62.98)	88.42 (70.39)	83.89 (66.69)	82.80 (65.46)	93.11 (75.39)	87.96 (70.42)
2.	Monocrotophos 36 SL	0.036%	78.23 (62.61)	87.56 (69.72)	82.89 (65.97)	84.21 (66.59)	93.72 (76.65)	88.96 (71.62)
3.	Methyl demeton 25 EC	0.025%	80.14 (63.54)	90.00 (72.02)	85.07 (67.78)	83.65 (66.14)	95.46 (78.65)	89.55 (72.39)
4.	Acephate 75 WP	0.037%	71.76 (57.98)	81.62 (64.75)	76.69 (61.37)	82.42 (65.22)	91.32 (73.08)	86.87 (69.15)
5.	NSKE	5%	45.82 (42.58)	55.39 (48.09)	50.60 (45.34)	49.82 (44.90)	59.42 (50.43)	54.62 (47.66)
6.	Nimbecidine 0.03 EC	5 ml l^{-1}	47.87 (43.76)	57.22 (50.18)	52.54 (46.97)	51.07 (45.61)	60.44 (51.04)	55.75 (48.32)
7.	*Karanj* seed extract	5%	42.33 (40.58)	51.64 (45.94)	46.98 (43.26)	47.72 (43.71)	58.40 (49.82)	53.06 (46.77)
8.	Imidacloprid 17.8 SL	0.002%	73.50 (59.00)	82.47 (60.39)	77.99 (59.66)	74.67 (59.69)	85.67 (67.80)	80.17 (6.81)
9.	*Metarrhizium anisopliae*	2×10^5 spores l^{-1}	19.71 (26.37)	27.41 (31.56)	23.56 (28.97)	37.23 (37.61)	43.81 (41.47)	40.52 (39.54)
10	Control	–	0.00	0.00	0.00	0.00	0.00	0.00
	Mean		65.69 (54.53)	74.97 (60.26)	70.33 (57.39)	69.84 (57.29)	79.98 (65.34)	74.91 (61.32)
			Treat.	Spray	Treat. X spray	Treat.	Spray	Treat. X spray
	SEm ±		0.99	0.47	–	1.08	0.51	–
	C.D. (P=0.05)		2.81	1.32	NS	4	1.43	NS

Figures in parentheses are angular values

treatment with *P. glabra* seed extract (5%) proved least effective followed by NSKE (5%) and nimbecidine (5 ml^{-1}) in reducing the thrips population.

Vevai (1972), Rathore and Agnihotri (1985) and Dhamaniya *et al.* (2005) reported that methyl demeton was effective insecticide for the control of thrips of mothbean crop. Dalaya *et al.* (1986), Ram and Choudhary (1997) reported that methyl-demeton as very effective for the control of thrips. Ekesi *et al.* (2001) reported that entomo pathogenic fungus *M. anisopliae* kept the flower thrips, *Megalhrothips syostedti* on cowpea under check. The growth regulatory effect of neem have been reported against thrips (NRC, 1992).

The yield data for both years indicated that maximum yield 6.17 q ha–1 was recorded in the plot treated with monocrotophos (0.036%) followed by dimethoate (0.03) and methyl demeton (0.025%), which yielded 6.06 and 5.97 q ha–1 grain yield, respectively. Lowest yield was recorded in untreated control (3.76 q ha–1). Earlier, Kumawat and Kumawat (1995) reported that spray of methyl demeton (0.03%) followed by monocrotophos (0.04%) gave the highest increase in yield of mothbean. The maximum net return was recorded in monocrotophos (0.036%), which gave a benefit cost : ratio of 5.44 followed by dimethoate (0.03%) and acephate (0.037%) which resulted in a benefit cost ratio of 4.95 and 4.81, respectively.

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Table 2. Efficacy of insecticides against thrips, *C. indicus* on mothbean, *V. aconitifolia* at seven and fifteen days interval (Pooled mean, *Kharif*, 2003 and 2004)

S.No.	Treatments	Dose Concentration	Mean per cent reduction in thrips population after seven days			Mean per cent reduction in thrips population after fifteen days		
			1st spray	2nd spray	Mean	1st spray	2nd spray	Mean
1.	Dimethoate 30 EC	0.03%	77.45 (61.31)	87.44 (71.35)	82.45 (66.33)	66.05 (54.34)	75.01 (60.08)	70.53 (57.21)
2.	Monocrotophos 36 SL	0.036%	75.82 (60.53)	87.46 (69.46)	81.64 (64.99)	65.01 (53.72)	74.20 (59.52)	69.60 (56.62)
3.	Methyl demeton 25 EC	0.025%	79.43 (63.08)	90.00 (71.90)	84.72 (67.49)	66.58 (54.67)	75.07 (60.14)	70.82 (57.40)
4.	Acephate 75 WP	0.037%	78.62 (62.68)	84.41 (66.89)	81.52 (64.79)	61.63 (51.75)	72.09 (58.13)	66.86 (54.94)
5.	NSKE	5%	53.98 (47.28)	63.73 (53.01)	58.85 (50.14)	44.28 (41.71)	52.77 (46.59)	48.53 (44.15)
6.	Nimbecidine 0.03 EC	5 ml l^{-1}	53.54 (47.02)	65.79 (54.26)	59.66 (50.64)	46.43 (42.94)	53.32 (46.91)	49.87 (44.92)
7.	*Karanj* seed extract	5%	51.70 (45.95)	62.20 (52.10)	56.95 (49.02)	41.76 (40.27)	50.60 (45.35)	46.18 (42.81)
8.	Imidacloprid 17.8 SL	0.002%	68.97 (56.15)	76.75 (61.30)	72.86 (58.72)	61.53 (51.68)	68.82 (56.09)	65.17 (53.89)
9.	*Metarrhizium anisopliae*	2×10^5 spores l^{-1}	67.60 (55.29)	76.77 (61.29)	72.18 (58.29)	57.75 (49.48)	67.28 (55.16)	62.51 (52.32)
10	Control	–	0.00	0.00	0.00	0.00	0.00	0.00
	Mean		67.46 (55.48)	77.17 (62.39)	72.31 (58.93)	56.78 (48.95)	65.46 (54.22)	61.12 (51.58)
			Treat.	Spray	Treat. X spray	Treat.	Spray	Treat. X spray
	SEm±		1.05	0.50	–	0.90	0.42	–
	C.D. (P=0.05)		2.96	1.49	NS	2.54	1.20	NS

Figures in parentheses are angular values

Table 3. Effect of insecticidal treatments on seed yield of mothbean, *V. aconitifolia*

S.No.	Treatments	Dose Concentration	Yield of mothbean q ha^{-1}		
			2003	2004	Pooled
1.	Dimethoate	0.03%	6.15	5.97	6.06
2.	Monocrotophos	0.036%	6.27	6.07	6.17
3.	Methyl demeton	0.025%	6.07	5.87	5.97
4.	Acephate	0.037%	5.47	5.78	5.63
5.	Neem seed kernel extract (NSKE)	5%	4.35	4.72	4.54
6.	Nimbecidine	5 ml^{-1}	4.70	4.82	4.76
7.	*Karanj* seed extract	5%	4.24	4.57	4.41
8.	Imidacloprid	0.002%	5.25	5.13	5.19
9.	*Metarrhizium anisopliae*	2×10^5 spore	4.85	4.93	4.89
10.	Control	-	3.83	3.68	3.76
	SEm±	-	0.16	0.09	0.10
	C.D. (P=0.05)	-	0.47	0.26	0.28

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