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EFFICACY OF INSECTICIDES, BIOPESTICIDES AND PLANT PRODUCT AGAINST THRIPS, *CALIOTHRIPS INDICUS* BAGNAL ON MOTHBEAN CROP

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ABSTRACT

Out of nine treatments (including botanicals and biopesticides), the treatment of 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 l^{-1}), whereas, acephate (0.037%), imidacloprid (0.002%) and *M. anisopliae* (2 x 10^5 spores l^{-1}) were in middle order of effectiveness. The maximum yield of 6.17 q/ha was obtained in the treatment of monocrotophos (0.036%) followed by dimethoate (0.03 %) and methyl demeton (0.025 %) which resulted in 6.06 and 5.97 seed yield ha^{-1}, respectively.

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

Mothbean 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, *Madurasia 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). Among the sap sucking insect pests, thrips are major as they weaken the pests at vegetative stage that results into poor flowering and pod formation. Besides, thrips are also a vector of viral or mycoplasma diseases.

MATERIALS AND METHODS

The experiment 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 plots measuring 2.40 m x 3.00 m keeping 30 cm and 15 cm row to row and plant to plant spacing, respectively.

The 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) *karanj* seed extract (5%), imidacloprid 17.8 EC (0.002%) and *Metarrhizium anisopliae* (2 x 10^5 spores/litre). The spray solution used for spraying the crop was maintained @ 600 l ha^{-1}. The observations of thrips were recorded one day before and 1, 3, 7 and 15 days after the application of insecticides. The analysis of variance was done after transforming the percentage mortality 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 calculated and statistically analysed.

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, significant difference existed among treatments and between spray and second spray was more effective than first one. The overall efficacy of insecticidal treatments during both the year at 1, 3, 7 and 15 days intervals against, *C. indicus* revealed that maximum mortality 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 x 10^5 spores l^{-1}) existed in middle order of effectiveness. The treatment of *Karanj* seed extract (5%) proved least effective followed by NSKE (5%) and nimbecidine (5 ml l^{-1}) in reducing the thrips population.

The present findings are in accordance with that of Vevai (1972), Rathore and Agnihotri (1985) and Dhamaniya *et al.* (2005) who reported methyl demeton as effective insecticide for the control of thrips on mothbean crop.

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	Conc. (%)	Mean per cent reduction in thrips population after one day			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 (59.69)	74.67 (59.82)	85.67 (67.80)	80.17 (63.81)
9	*Metarrhizium anisopliae*	2 x 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

The present findings also agree with that of Dalaya *et al.* (1986), Ram and Choudhary (1997) on mungbean who reported that methyl–demeton as very effective insecticide for the control of thrips. Ekesi *et al.* (2001) reported that entomopathogenic fungus *M. anisopliae* kept the flower thrips, *Megalurothrips syostedti* on cowpea under check. The effect of neem have also been reported against thrips (NRC, 1992).

The yield data of both the 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}). The present results are in agreement with that of Kumawat and Kumawat (1995) who reported that the 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	Conc. (%)	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 x 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*

Sr. No.	Treatments	Conc. (%)	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*	2x10^5	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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