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Effect of Certain Chemical and Botanical Insecticides on some Beneficial Insects associated with Mustard

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ABSTRACT

Use of botanical insecticides did not affect aphid mummies caused by parasitoids, *Diaeretiella rapae* Curtis. They also did not significantly reduce the parasitoid adult emergence from these mummies. Botanicals were also found to be considerably safe to bee- visits.

The mustard aphid, *Lipaphis erysimi* (Kalt), a serious pest of mustard is parasitised by the braconid, *Diaeretiella rapae* Curtis (Atwal *et al.*, 1969). The parasitic activity begins in the second or third week in January and reaches 80-90% by third week or fourth week of February (Singh and Rawat, 1983). Phosalone and methamidophos are safe, vamidothion, phoxim, dicrotophos and monocrotophos are moderately toxic and malathion, fenvalerate, quinalphos, endosulfan and methyl demeton are reported to be highly toxic to *D. rapae* (Singh and Rawat, 1981) while oxydemeton methyl and endosulfan have been found to be safe to honeybees which frequent mustard flowers (Harvir Singh *et al.*, 1987). Results of an experiment to determine the safety of few more chemicals and some plant - based indigenously prepared insecticides on both *D.rapae* and honeybees *Aphis dorsata, A.serana indica* etc. are reported in this paper.

MATERIALS AND METHODS

An experiment was laid with mustard (Pusa bold) raised in November, 1993 at Akola, Maharashtra. Twelve treatments (Table 1) were evaluated in three replications. The gross plot size was 4.5 X 3 m (net 3.6 X 2.6 m). The treatments included two indigenously formulated plant products *viz.*, formula-1 and 2 (locally used by the farmers). Formula 1 was prepared by peeling and grinding garlic (500g) and mixing the paste in kerosene (250 ml). Simultaneously, paste of green chilli (950 g) was mixed in water (100 ml). Nirma washing powder (100 g) was dissolved in water (400 ml.) Next day, all the ingredients were sieved, mixed together and sprayed using 15 ml/l of water. For preparing formula-2, tobacco (250 g) was soaked in water (1000 ml). Paste of peeled garlic (500 g) was put in kerosene (250 ml) and paste of green chilli (250 g) in water (150 ml) separately. Neem oil (100 ml) was stirred with Nirma powder (150 g) in water (300 ml). The next day, all the ingredients were sieved and mixed together. Forty ml of this solution was diluted in 15 l of water and sprayed.

Two sprays were applied to the respective plots on 7th January and 18th January 1994, when aphid infestation was observed. Observations on mummies, emergence of adult parasitoids (in laboratory) and number of visiting bees during morning hours (5 minutes visual observation per plot) after spray were recorded. The data collected were analysed using ANOVA, after appropriate transformations.

RESULTS AND DISCUSSION

There was no significant difference in the number of mummies recorded in different treatments from 64 to 72 days after sowing. From 75 days onwards of sowing, the number of mummies in untreated plots was highest followed by plots treated with botanical insecticides. The number of mummies found in plots treated with chemical insecticides were significantly lower than in other plots. The results

Table 1. Effect of insecticides on mummification of aphid, emergence of *D. rapae* and bee visits.

Treatments	Mummification of aphid at various days after sowing					Emergence of adult	Reduction in bee visits days after spray	
	75	77	79	83	86	*D. rapae*	1	3
Endosulfan 0.035%	3.2 abcd	37.8 abc	43.1 abc	34.5 bcd	24.6 bcd	57.8 d	23.4 c	69.8 bc
Chlorpyriphos 0.03%	2.3 cd	25.2 bcd	27.7 bcd	31.7 abcd	25.4 bcd	66.7 cd	38.4 ab	79.0 a
Fenvalerate 0.01%	2.1 d	14.9 cd	20.8 de	16.9 d	15.4 cd	56.7 d	42.5 a	79.3 a
Monocrotophos 0.036%	2.5 cd	27.0 bcd	22.2 cde	18.5 cd	12.8 d	76.7 bc	33.6 b	74.8 ab
Methyl demeton 0.025%	2.7 bcd	16.48 cd	20.8 de	16.4 bcd	13.6 d	50.0 d	20.6 c	67.9 c
Quinalphos 0.05%	1.9 d	8.3 d	8.2 e	11.3 d	6.7 d	53.33 d	36.8 ab	78.7 a
NSKE 5%	4.9 abcd	42.3 ab	49.8 ab	53.2 a	52.5 ab	86.7 ab	9.1 d	56.8 de
Neem oil 0.3%	6.8 abcd	42.3 ab	44.2 abc	42.9 abc	39.2 abc	88.9 ab	11.1 d	61.1 d
Cotton seed oil 3%	6.3 abcd	44.5 ab	48.7 ab	44.3 abc	41.7 ab	90.0 ab	10.6 d	61.3 d
Formula 1	8.5 ab	64.0 a	54.2 a	54.7 a	52.8 ab	91.1 a	9.1 d	58.7 b
Formula 2	7.2 ab	62.9 a	58.2 a	61.8 a	57.4 a	88.9 a	10.5 d	58.2 b
Control	9.7 a	55.7 ab	40.1 abcd	47.1 ab	54.2 ab	93.3 a	8.2 d	55.2 e

Means in the same column with letters in common are not significantly different (P=0.05)

revealed that botanical insecticides were relatively safe to this parasitoid. Safety of pyrethrins, rotenone and nicotine sulphate against biocontrol agents of aphids has been reported by Singh *et al.* (1985).

Maximum emergence of *D.rapae* was observed in the control plot (93.3%). This did not significantly differ from formula-2 (88.9%), formula-1 (91.1%), cotton seed oil 3% (90.0%), neem oil 0.3% (88.9%) and NSKE 5% (86.7%). This indicated the safety of botanical insecticides to the parasitoid. Spray of monocrotophos 0.036% was also found to be comparatively safer (76.7%) as it was on par with the latter three botanicals.

NSKE 5%, formula-1 and 2, cotton seed oil 3% and neem oil 0.3% did not significantly decline bee visits 24 h after spray as compared to other treatments. Amongst the insecticides, fenvalerate 0.01%, chlorpyriphos 0.03% and quinalphos 0.05% adversely affected the bee visits. Singh and Rawat (1981) also reported that monocrotophos, fenvalerate, quinalphos, endosulfan and methyl demeton were more toxic to honey bees.

The foregoing reports indicate the importance of the choice of insecticides for the control of *L.erysimi* on mustard, particularly when *D.rapae* is active, and at flowering period when honey bees are more active.

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