

Effect of some pesticides on foraging activities of different species of honey bees in mustard (*Brassica juncea* L.)

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ABSTRACT

The visiting of four species of honey bees viz., *Apis dorsata*, *Apis florea*, *Apis cerana indica* and *Apis mellifera* were recorded on mustard crop. The observations on visiting of honey bees showed that the Neem products, Achook was found least toxic to honey bees due to their higher visits i.e. 3.05, 4.40, 4.42 and 6.35 and 6.70 per three minutes per sq. m area just after 24, 48, 72 hours and after 5 days of application followed by Bioneem i.e. 2.10, 3.15, 3.71, 5.70 and 6.37 visits, respectively. Nimbicidine also provided 1.37, 2.40, 3.10, 5.40 and 5.70 visits of honey bees per three minutes in one square meter area in comparison to rest of the treatments. While maximum visits were recorded in untreated plot i.e. 7.11, 7.55, 7.72 8.33 and 8.40 visits. Thus, Achook and Bioneem were found safer to honey bees and recommended to the farmers for the control of aphids (*Lipaphis erysimi*) in mustard crop.

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Key words : *Brassica juncea*, Honey bees, Bioneem, Imidacloprid

INTRODUCTION

Flowering Brassicas are not only visited by a large number of insects pollinators especially honey bees for nectar and pollen but they also attract insects which feed upon flowers and developing seeds causing serious economic losses. Consequently, the insecticides are to be applied for crop protection which severely harm to the pollinating species (Mayer, 1980). Indian mustard (*Brassica juncea*), an important oilseed crop, constitute approximately 80 per cent of total production of rapeseed and mustard in India (Yadav *et al.*, 1985). Mustard aphid attacks this crop at the time of flowering and pod formation, so it requires application of insecticides to combat the pest. But the impact of these insecticides on the flowering activity of wild honey bee pollinators which mostly from neighboring wild habitats or hives on the contaminated crops have not received much attention. Thus, the present studies were therefore, undertaken with a view to find out the adverse effects of some insecticides on foraging activity of honey bees, *Apis dorsata*, *Apis florea*, *Apis cerana indica* and *Apis mellifera* visitors to *Brassica juncea* var. Varuna.

MATERIALS AND METHODS

This study was carried out at C.S.A. University of Agriculture and Technology, Kanpur. To evaluate the

impact of insecticides, their commercial formulations were sprayed with the help of Maruti foot sprayer on the field plots of 5x3 m size of Indian mustard (*Brassica juncea* L var. Varuna) during its peak flowering period. The spray was made between 10.00- 12.00 h during the maximum activity period of honey bees. Each spray was replicated thrice and the observations on the number of foraging of bees were recorded by visual count just after 24 hrs, 48 hrs, 72 hrs and 5 days of insecticidal application in 1 sq. m area for 3 minutes in treated and control plots between 10.00-12.00 hrs. The population of bees recorded on the basis of visual counts as adopted by Swaminathan and Bharadwaj (1982).

RESULTS AND DISCUSSION

When the insecticides were applied on the flowering stage of crop, the floral tips retained relatively less amount of insecticidal deposits than leaves and stems. Thus, the foraging bees coming in contact with floral parts may receive sub lethal amount of toxicants. Visual observations on foraging honey bees immediately after application of insecticides revealed a temporary decline in the forging activity in treated fields but the data were not consistent to document a decline pattern. This may be attributed to the wind charged with smell of drifting and evaporating of insecticides all over the fields.

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Table1: Effect of insecticidal treatments on bee pollinators visiting flowering mustard

Treatments	Doses	Mean bee visitors at different intervals after spray					Seed yield	
		Just after	After 24 hours	After 48 hours	After 72 hours	After 5 days	kg/15 sqm	kg/ha
Achook	0.75%	3.05 (1.87)	4.40 (2.21)	4.42 (2.19)	6.35 (2.60)	6.70 (2.62)	2.891	1927.33
Bioneem	0.75%	2.10 (1.59)	3.15 (1.90)	3.71 (2.03)	5.70 (2.47)	6.37 (2.56)	2.869	1912.66
Nimbecidine	0.75%	1.37 (1.37)	2.4 (1.70)	3.10 (1.89)	5.40 (2.43)	5.70 (2.45)	2.8005	1867.00
Endosulfan	0.07%	1.01 (1.22)	1.70 (1.48)	2.05 (1.60)	3.05 (1.88)	4.69 (2.27)	2.722	1814.66
Malathion	0.05%	0.70 (1.09)	1.37 (1.37)	1.70 (1.50)	2.36 (1.70)	4.35 (2.20)	2.697	1798.00
Biolep	0.75 kg/ha	1.35 (1.36)	2.37 (1.70)	2.71 (1.80)	4.70 (2.30)	5.70 (2.49)	2.7835	1855.66
Imidacloprid	0.0178%	1.90 (1.48)	2.11 (1.61)	2.16 (1.60)	4.37 (2.20)	5.05 (2.35)	2.7782	1852.00
Control		7.11 (2.72)	7.55 (2.81)	7.72 (2.85)	8.33 (2.97)	8.40 (2.82)	2.928	1952.00
S.E.±		0.20247	0.1478	0.1739	0.1372	NS	0.04458	29.72
C.D. (P=0.05)		0.43426	0.3162	0.3731	0.2942	-	0.09561	63.74

The data presenting in Table 1 indicate that the number of foraging bees were found that Neem product, Achook was least toxic against honey bees by giving highest visits *i.e.* 3.05, 4.40, 4.42, 6.35 and 6.70 per three minutes per sq. m area just after 24 hrs, 48 hrs, 72 hrs and 5 days of insecticidal application followed by Bioneem visits *i.e.* 2.10, 3.15, 3.71, 5.70 and 6.37, respectively. Nimbecidine also provided 1.37, 2.40, 3.10, 5.40 and 5.70 visits per 3 minutes per sq. m area in comparison to the remaining treatments but the maximum 7.11, 7.55, 7.72, 8.33 and 8.40 visits were found in untreated plot. The decrease was in number of pollinators visits due to toxic and repellent effect of different insecticides suppressing the yield of mustard crop. The lowest crop yield was obtained *i.e.* 1798.00 kg/ha in Malathion treated plots because these were more toxic against bee pollinators. Imidacloprid and Biolep were less toxic to pollinators than Malathion and Endosulfan so their yield was little bit higher than those provided *i.e.* 1852.00 and 1855.66 kg/ha. The spray of Nimbecidine, Bioneem and Achook were less toxic provided higher yield *i.e.* 1867.00, 1912.66 and 1927.33 kg/ha which were near to 1952.00 kg/ha in control plots. Muranjan *et al.* (2006) tested seven individual insecticides and Chlorpyrifos was found to be slightly toxic to *A. cerana indica*. Kavitha *et al.* (2006) reported

that spiromesifen was found to be safe to honey bees for 3 hrs contact, where as triazophos and dicofol caused more than per cent mortality to bees.

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