

TOXICITY OF INSECTICIDES TO THE APHID *Aphis craccivora* KOCH. AND TO THE COCCINELLID PREDATOR *Menochilus sexmaculatus* F. ON COWPEA AND HYACINTH BEAN

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Field experiments conducted to evaluate the efficacy of certain insecticides for the control of the aphid, *Aphis craccivora* Koch. on cowpea and hyacinth bean showed that methyl demeton 0.025% spray was the best, the alternate insecticide being monocrotophos 0.04%. Endosulfan 0.07% was the safest insecticide for the coccinellid predator *Menochilus sexmaculatus* F. followed by monocrotophos 0.04%.

Cowpea (*Vigna unguiculata* (L.) Walp.) and hyacinth bean (*Lathyrus purpureus* (L.) Sweet.) are main sources of vegetable protein. Among the various pests that attack these two crops, the aphid, *Aphis craccivora* Koch. is an important one. When young seedlings are infested the damage is very severe resulting in even death of plants. The aphids infest the foliage, stem, flowers and pods & suck the sap which result in crinkled and malformed leaves, flower drop, curling of pods and reduction in yield. Predatory coccinellids keep the aphids in check in nature.

MATERIALS AND METHODS

Two field experiments were conducted to evaluate the efficacy of certain insecticides for the control of the aphid, *A. craccivora* and also to note the toxicity of these insecticides on the predatory coccinellid, *M. sexmaculatus* on cowpea and hyacinth bean. In the first experiment on

cowpea, five insecticides were compared with the farmer's treatment (HCH 10 D) and an untreated check replicated thrice. In the second experiment on hyacinth bean, five insecticides were compared in four replications. In both the experiments the plot size was 5X4 m per replicate. Observations were made on the population of aphids and coccinellid grubs before treatment and 1, 3, 7 and 10 days after treatment on five tagged plants in each plot. The reduction in population of aphids and coccinellid grubs after treatment was worked out as per Henderson and Tilton (1955) and then the data were transformed and statistically analysed.

RESULTS AND DISCUSSION

The reduction in aphid and coccinellid grub population after treatment in cowpea and hyacinth bean are given in Table 1 and 2 respectively.

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Aphids

Cowpea: Among the treatments methyl demeton 0.025% spray recorded the maximum reduction in aphid population at all the periods after treatment. At 1, 3 and 10 days after treatment, monocrotophos 0.04% was next in merit while at 7 days after treatment endosulfan was the next best. Dimethoate 0.03% ranked third in reducing aphid population. HCH 10 D which was used the least effective recording lesser population reduction of aphid than even untreated check. As period after treatment progressed, population reduction of aphids had increased. Both the periods and interaction between treatments and periods were significant.

Hyacinth bean: At 3, 7 and 10 days treatment, methyl demeton 0.025% was the most efficacious insecticide, in reducing aphid population. At one day after treatment, monocrotophos 0.04% recorded the maximum reduction, however, it was on a par with methyl demeton, while at all other periods monocrotophos was next in order to methyl demeton. Untreated control plots recorded the lowest population reduction of aphids.

In both the trials methyl demeton 0.025% and monocrotophos 0.04% sprays recorded higher reductions in aphid population. Sundara Babu (1969) reported the efficacy of methyl demeton 0.025%, menazon

0.05% and carboxophenothin 0.06% for the control of *A. craccivora* on groundnut.

Coccinellid grubs

Cowpea: Considering the reduction in coccinellid grub population, untreated control plots recorded the minimum population reduction. In the insecticidal treatments tried the reduction in coccinellid grub population was the least in endosulfan 0.07% spray followed by monocrotophos 0.04% spray and these two were on a par 10 days after treatment. Phosphamidon, dimethoate and methyl demeton were next in the order of toxicity to coccinellid grubs and these three were on a par. HCH 10% dust was the most toxic to the coccinellid grubs and was statistically significant to all other treatments at all periods of observation. The data collected during different periods after treatment were independently significant. As periods increased there was increase in the population reduction of coccinellid grubs. The interaction between treatments and periods were also significant.

Hyacinth bean: Untreated plots recorded the minimum reduction in population of coccinellid grubs. Among the insecticides, endosulfan 0.07% registered minimum reduction at all the periods of treatment. The next in the order was monocrotophos 0.04%. Methyl demeton 0.025%, dimethoate 0.03% and phosphamidon

Table 1. Reduction aphid and coccinellid grub population after treatment in cowpea (Mean of three replication)

Treatments (sprays)	Aphid population reduction ^①					Coccinellid grub population reduction ^②				
	1 day	3 days	7 days	10 days	Mean	1 day	3 days	7 days	10 days	Mean
Methyl demeton 0.025%	32.74 (34.82)	78.74 (62.58)	94.18 (75.97)	98.68 (83.41)	76.08 (64.19)	36.88 (38.04)	72.17 (58.16)	91.62 (73.19)	97.44 (80.60)	74.53 (60.25)
Dimethoate 0.03%	15.83 (23.38)	44.31 (41.71)	68.50 (56.04)	87.34 (69.13)	53.95 (47.56)	62.46 (52.28)	74.40 (59.68)	82.19 (65.20)	97.44 (81.34)	79.29 (64.63)
Phosphamidon 0.05%	24.97 (29.94)	44.24 (41.66)	61.41 (51.56)	81.22 (64.32)	52.96 (46.87)	56.68 (48.89)	76.84 (61.32)	87.28 (60.10)	97.00 (79.79)	79.45 (64.75)
Monocrotophos 0.04%	30.31 (33.31)	56.33 (48.74)	65.18 (53.87)	92.48 (74.36)	61.07 (52.57)	28.81 (32.31)	53.17 (46.82)	64.20 (49.92)	77.90 (63.60)	56.02 (48.17)
Endosulfan 0.07%	15.49 (22.98)	32.17 (35.77)	73.01 (58.70)	77.78 (63.27)	49.61 (45.18)	18.54 (25.00)	31.78 (34.27)	49.59 (44.78)	80.25 (62.61)	45.04 (41.92)
HCH 10 D (BHC dust - Farmer's treatment)	12.39 (20.52)	6.14 (13.44)	4.06 (10.76)	12.06 (20.65)	8.91 (16.34)	71.01 (57.45)	88.18 (69.90)	96.72 (77.43)	97.31 (80.65)	88.31 (71.36)
Untreated check	14.03 (21.99)	16.34 (23.83)	21.21 (27.69)	24.75 (29.79)	19.08 (25.82)	5.60 (13.59)	9.56 (14.53)	0.00 (1.28)	0.00 (1.28)	2.296 (7.65)
Mean	20.82 (26.70)	33.42 (38.25)	45.36 (47.79)	67.90 (57.84)		39.99 (38.22)	58.01 (49.24)	67.37 (54.41)	78.39 (64.41)	
		SE	CD (P=0.05)			SE	CD (P=0.05)			
Between treatments		1.36	2.72			1.63	3.27			
Between periods		1.03	2.06			1.23	2.47			
Treatments X periods		2.71	5.45			3.25	6.25			

① Figures in parentheses are arc sine / percentage values

② Figures in parentheses are 1/4 n X 100 transformed values

Table 2. Reduction aphid and coccinellid grub population after treatment in hyacinth bean (Mean of three replications)

Treatments (sprays)	Aphid population reduction					Coccinellid grub population reduction				
	1 day	3 days	7 days	10 days	Mean	1 day	3 days	7 days	10 days	Mean
Methyl demeton 0.025%	55.57 (48.19)	84.13 (68.53)	96.58 (79.38)	99.45 (86.19)	83.94 (70.06)	46.02 (42.69)	75.24 (60.27)	92.20 (73.90)	96.51 (79.22)	77.49 (63.98)
Dimethoate 0.03%	38.31 (38.18)	48.26 (44.00)	72.60 (58.42)	87.45 (69.24)	61.65 (52.61)	68.00 (55.52)	78.67 (62.47)	88.97 (70.60)	95.19 (77.37)	81.20 (66.49)
Phosphamidon 0.05%	37.65 (37.61)	46.31 (42.87)	60.60 (51.09)	89.27 (70.91)	58.45 (50.67)	62.02 (51.96)	77.03 (61.39)	90.49 (72.03)	94.80 (76.84)	81.05 (65.55)
Endosulfan 0.07%	42.20 (40.45)	57.93 (48.37)	68.74 (56.05)	87.11 (69.93)	63.49 (53.45)	29.85 (33.07)	40.78 (39.66)	65.98 (54.29)	72.40 (59.31)	52.25 (46.33)
Monocrotophos 0.04%	57.50 (49.50)	83.25 (65.81)	95.28 (77.50)	98.83 (83.79)	83.81 (69.15)	34.34 (36.07)	48.04 (43.85)	70.18 (56.89)	76.22 (60.80)	57.19 (49.40)
Untreated check	8.56 (16.61)	12.69 (20.81)	17.14 (24.28)	20.46 (26.28)	14.71 (22.16)	3.52 (10.43)	3.52 (10.43)	4.75 (12.27)	4.75 (12.27)	4.13 (11.35)
Mean	40.03 (38.49)	55.89 (48.06)	68.49 (57.80)	80.42 (67.65)		40.64 (38.28)	55.38 (46.34)	68.76 (56.64)	73.31 (60.80)	

	SE	CD
Between treatments	0.82	1.64
Between periods	0.66	1.32
Treatments X periods	1.63	3.26

Figures in parentheses are a. c. sine /percentage values

0.05% had recorded very high population reduction of coccinellid grubs. The data collected during different periods after treatment were independently significant. There was an increase in reduction of coccinellid grubs as the period after treatment progressed. The interaction between treatments and periods were also significant.

Sugumar (1980) reported that endosulfan was comparatively safer to predatory coccinellids, methyl demeton and monocrotophos were toxic to predatory coccinellids. Morse and Bellows (1986) found dimethoate to be highly toxic to *Cryptolaemus montrouzieri* Mulsant.

From the field trials conducted it may be concluded that sprays of methyl demeton 0.025% or monocrotophos 0.04% can be recommended for the control of *A. craccivora* on

cowpea and hyacinth bean but wherever predatory coccinellids are active these two insecticides will be toxic and hence endosulfan will be preferable under such situation.

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