GAU Res. J. 1992. 17 (2) : 161-164

Residual Toxicity of Some Insecticides Against *Aphis craccivora* Koch on Cowpea Crop*

V. S. Kotadia and P. A. Bhalani**

Pulse Research Station, Gujarat Agricultural University, Junagadh Campus, Junagadh-362 001

The cowpea aphid, *Aphis craccivora* Koch is a serious pest of cowpea crop throughout India. The nymphs and adults suck the cell sap from host plant. The damage to the crop results in profuse draining of plant sap, development of honey dew leading to black shooty mould and leaf shedding. A virus "Rosttee" is known to be transmitted by the aphid, *A. craccivora* (Atwal, 1976). The pest is more active during *kharif* season than in summer crop. In view of the economic importance of the pest on cowpea (Srivastava and Singh, 1976; Patel and Patel, 1971; David and Kumarswami, 1982) several workers have evaluated the insecticides for its control (Polevshchikora and Sorokina, 1969; Sharma and Verma 1972 and David and Kumarswami, 1982). Present study was undertaken to evaluate the residual toxicity of some commonly used insecticides by farmers along with some new insecticides. 'Pusaphalguni', a variety of cowpea crop was grown at College Farm, Junagadh, during *kharif* 1986. Two rows of 5 meter length of cowpea crop for each treatment were sprayed with recommended concentrations of insecticides. The treated shoots from the respective treatments were brought to the laboratory at alternate days upto 15 days. Twenty nymphs of third instars of laboratory reared aphids were released separately in petri dishes containing treated twigs of cowpea and each set was repeated four times. Observations on the nymphal mortality were recorded after 24 hours of release. The percentage mortalities were corrected by applying modified Abbott's formula and zero and cent per cent values were replaced by applying the formula 1/4n x 100, where n = number of nymphs per treatment. The data thus obtained were transformed into arcsin values for statistical analysis. Persistant toxicity (PT) and relative persistant toxicity (RPT) values were also worked out. The results thus obtained are presented in Table 1.

The data on mortality of third nymphal instar of *A. craccivora* for one day after spraying revealed that the maximum mortality was recorded in treatment with 0.03 per cent demeton-o-methyl (98.04) and it was significantly superior to other insecticidal treatments except formothion, endosulfan, fluvalinate and BPMC. All these treatments gave above 90 per cent mortality of the pest. The lowest mortality percentage was found in

*Part of thesis submitted by first author to the Gujarat Agricultural University in partial fulfilment of Master degree in Agricultural Entomology.

**Senior Research Assistant, Department of Plant Pathology, College of Agriculture, Junagadh.

TABLE 1

Residual persistant toxicity of some insecticides aganst the third instar nymph of *A. craccivora*.

Sr. No.	Treatment	Concen-tration (%)	Mean per cent corrected mortality of the third instar nymph at different interval (day) 1	3	5	7	9	11	13	15	Persistant toxicity (P T)	Relative persistant toxicity (R P T)
1.	Phosphamidon	0.03	80.20 (97.10)*	67.98 (85.94)	64.32 (81.22)	61.31 (76.95)	56.13 (68.94)	49.41 (57.67)	27.34 (21.09)	15.56 (7.20)	930.77	0.924
2.	Dimethoate	0.03	80.30 (97.16)	77.38 (95.23)	70.22 (88.55)	65.96 (83.40)	56.13 (68.94)	52.37 (62.72)	35.42 (33.59)	15.89 (7.50)	1007.04	1.000
3.	Dimeton-o-methyl	0.03	81.96 (98.04)	77.05 (94.98)	66.96 (84.68)	60.48 ((75.72)	53.94 (65.35)	50.08 (58.82)	26.48 (19.88)	11.53 (3.73)	939.75	0.933
4.	Formothion	0.05	72.37 (90.93)	63.01 (79.40)	58.75 (73.09)	56.34 (69.28)	40.66 (42.45)	37.63 (37.28)	28.14 (22.24)	14.51 (6.28)	789.26	0.784
5.	Monocrotophos	0.04	76.22 (94.33)	70.41 (88.76)	65.10 (82.27)	56.60 (74.39)	50.79 (60.04)	44.28 (48.74)	29.14 (22.64)	15.89 (7.50)	897.51	0.898
6.	Quinalphos	0.05	78.66 (96.13)	65.04 (82.90)	59.61 (74.41)	55.54 (67.98)	44.28 (48.74)	41.40 (43.73)	29.08 (23.62)	14.47 (6.24)	830.70	0.825
7.	Endosulfan	0.07	68.51 (86.58)	60.35 (75.33)	56.32 (69.25)	52.43 (62.82)	40.66 (42.45)	35.42 (33.59)	25.54 (18.59)	15.56 (7.20)	742.52	0.737
8.	Dichlorvos	0.05	73.97 (92.37)	63.01 (79.40)	52.37 (62.72)	51.72 (61.62)	39.22 (39.98)	36.99 (36.20)	22.65 (14.38)	11.46 (3.95)	733.26	0.728
9.	Chlorpyriphos	0.05	80.30 (97.16)	62.35 (78.46)	52.37 (62.72)	49.44 (57.72)	39.19 (39.93)	30.75 (26.14)	21.70 (13.67)	13.09 (5.13)	714.24	0.709
10.	BPMC	0.15	63.92 (80.67)	60.32 (75.48)	44.92 (59.86)	43.49 (47.40)	37.75 (37.48)	29.85 (22.77)	20.62 (12.40)	13.09 (5.13)	639.74	0.635
11.	Fluvalinate	0.15	67.94 (85.89)	66.01 (83.47)	53.43 (64.50)	48.70 (56.44)	33.94 (31.17)	32.37 (28.66)	22.65 (14.83)	11.17 (3.75)	691.33	0.687
	S. Em. ±		2.84	2.50	1.44	1.45	2.09	2.20	1.82	2.08		
	C. D. at 5%		8.19	7.22	4.18	4.19	6.04	6.35	5.20	N.S.		
	C. V. %		7.60	7.50	5.00	5.00	9.36	11.10	13.93	30.41		

*Figures in paranthesis are angular retransformation values.

BPMC 0.15 per cent (80.67%) and it was at par with the treatments fluvalinate 0.015 per cent (85.89%) and endosulfan 0.07 per cent (86.58%).

Results obtained three days after insecticidal application were found significant. The dimethoate 0.03%, demeton-o-methyl 0.03%, monocrotophos 0.04% and phosphamidon 0.03% were found significantly superior over rest of the treatments giving over 85% mortality of nymphs, whereas all the remaining treatments gave 75.48 to 83.47% mortality of the pest and were at par with each other.

Data recorded 5 days after spraying the treatments of phosphamidon, dimethoate and demeton-o-methyl each at 0.03% and monocrotophos 0.04% were significantly superior to the rest of the insecticides and they gave more than 82% mortality of the nymphs and were at par with each other in their efficacy.

Seven days after the application dimethoate was found significantly superior over rest of the insecticides in killing the third instar nymphs of the pest giving 83.40% mortality followed by demeton-o-methyl, phosphamidon and monocrotophos which gave 75.72, 76.95 and 74.39% mortality of nymphs, respectively. The treatments, quinalphos, endosulfan and formothion gave 62.82 to 69.28 per cent mortality of nymphs, whereas only 47.40 per cent mortality of nymphs was recorded when treated with BPMC.

The results recorded after 9 days of the insecticidal application revealed that the phosphamidon, dimethoate, demeton-o-methyl and monocrotophos gave above 60% nymphal mortality and they were significantly superior over remaining insecticides. These treatments were followed by quinalphos, endosulfan, dichlorvos, chlorphyriphos, BPMC and formothion, and were at par with each other. The lowest residual toxicity was found with fluvalinate which gave only 31.17 per cent mortality.

It was evident from the data recorded 11 days after spraying that the treatments of phosphamidon, dimethoate, demeton-o-methyl and monocrotophos provided 57.67, 62.72, 58.82 and 48.74% mortality of third instar nymphs, respectively. The residual toxicity of rest of the insecticides was lower down to below 45 per cent. The toxicity of insecticides was further lowered down on 13 and 15 days after spray and residual persistant toxicity remained below 35 and 10 per cent respectively. According to the RPT values of the treatments, the insecticides can be arranged in the descending order as dimethoate > demeton-o-methyl > phosphamidon > monocrotophos > quinalphos > formothion > endosulfan > dichlorvos > chlorphyriphos > fluvalinate > BPMC. Similar results were also reported by polevshchikora and Sorokina (1969). They have reported that dimethoate and phosphamidon gave effective control upto 20 days against *A. craccivora* on cowpea crop. Thakur *et al.*, (1984) also reported that dimethoate 0.03% gave longer residual effect to aphid on lentil crop.

(Received on 23rd May, 1988)

REFERENCES

Atwal, A. S. 1976. "Agricultural pests of India and south East Asia". Kalyani publishers, Ludhiana, pp. 207-272.

David, B. V. and T. Kumarswami, 1982. "Elements of economic Entomology. Popular Book Dept., 37, Balaji Singh Street, Saidapet, Madras-15, pp. 81-84.

Patel, R. M. and C. B. Patel, 1971. Factors contributing to the carry over of groundnut aphid, *Aphis craccivora* Koch through the off-season in Gujarat. *Indian J. Ent.*, **33** (4) : 404.

Polevshchikora, V. N. and V. I. Sorokina, 1969. Pests of leguminous crops and elaboration of measures for their control. (pp. 85-109, 8 figs). (R.A.E.(A) **57** (2) : 110.

Sharma, S. R. and A. Verma, 1972. Effect of systemic insecticides on virus infestation in cowpea *Indian J. Ent.*, **34** (4) : 361-364.

Srivastava, K. M. and L. N. Singh, 1976. A review of the pest complex of kharif pulses on Uttar Pradesh. *Pans.* **22** (3) 333-335.

Thakur, B. S.; R. Verma; Patitunda,; R. R. Anita Rawat, 1984. Chemical control of aphis (*Aphis craccivora Koch) on lentil. Indian J. Ent.*, **46** (1) : 103-105.