

RESEARCH NOTES

Toxicity of Insecticides to *Encarsia perniciosi* Tower and *Aphytis proclia* Walker

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Among the insect pests of apple orchards, San Jose scale *Quadraspidiotus perniciosus* (Comstock) is a key pest in all the apple-growing areas of Jammu and Kashmir. The pest sucks the sap, thereby debilitating plant health and reducing the quality of the fruit. Several predators and parasitoids have been reported on San Jose scale in India out of which two aphelinid parasitoids *Encarsia perniciosi* Tower and *Aphytis proclia* Walker are of considerable importance (Masoodi and Trali, 1987; Bhagat *et al.*, 1988).

Being a high value crop, economic thresholds of various direct pests of apple is quite low. The control programme therefore are of preventive nature requiring frequent use of broad spectrum pesticides. To develop a sound pest management strategy, information on toxicity of insecticides to some potential biocontrol agents is imperative. Accordingly, some insecticides commonly used in apple orchards were screened in the laboratory for their relative toxicity to adult parasites.

Six insecticides (Table 1) were screened for their toxicity to one day-old adults of *E. perniciosi* and *A. proclia* maintained on *Q. perniciosus* developed on mature pumpkins in the laboratory at 24.4 - 26.6°C and 40 - 60 per cent relative humidity. One day-old adult parasites were exposed to the residues of insecticides applied uniformly on glass plates within test cage (Oomen, 1985). The control glass-plates were sprayed with tap water. Strips of honey paper were provided as food

to the adults since starvation increased the susceptibility to insecticides (Kerr, 1948). Insecticide solutions replicated three times were applied at 1 mg fluid/cm² while that of check were applied with tap water. Treated plates were dried at room temperature before the cage was assembled. Twenty adult parasites were introduced in the exposure cages. Mortality was recorded 1, 4 and 24 h of exposure. The data on percentage kill of parasites were transformed by arcsine transformation for stabilization of data.

The results (Table 1) show that all the five insecticides screened are toxic to both the species of adult parasites. While the susceptibility of *A. proclia* and *E. perniciosi* to the insecticides varied at the end of 1 hour of exposure, cent per cent mortality of parasites was observed after 4 hours of exposure. It was, however, clear that there was no significant difference in the toxicity of insecticides to *A. proclia* and *E. perniciosi*. Considering the mortality of adults of *E. perniciosi* and *A. proclia* after 4 hours of exposure, monocrotophos, ethion, acephate and three pyrethroids (decamethrin, cypermethrin and fenvalerate) were toxic to the beneficials. While no studies seem to have been conducted on the relative toxicity of insecticides on these aphelinid parasites, some information is available on some other closely related parasites. In France, phosalone, endosulfan, methyl demeton, primicarb, dicofol and pyrethroids were found harmful to *Encarsia formosa*, a congeneric species of *E. perniciosi* (Hassan, 1983; 1985).

Table 1. Toxicity of insecticides to adults of *E. perniciosi* and *A. proclia*

Treatment	Percent		Mortality				Mean	
	1	4	(after exposure)				24	
	EP	AP	EP	AP	EP	AP	EP	AP
Monocrotophos (0.05)	88.33 (70.03)	86.66 (68.58)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	97.66 (81.28)	97.33 (80.54)
Phosmite (0.05)	91.66 (73.29)	88.33 (70.03)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	98.33 (82.51)	97.66 (81.28)
Decamethrin (0.01)	88.33 (70.03)	90.00 (71.57)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	97.66 (81.28)	98.00 (81.87)
Cypermethrin (0.01)	91.66 (73.29)	90.00 (71.57)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	98.33 (82.51)	98.00 (81.28)
Acephate (0.05)	86.66 (68.58)	88.33 (70.03)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	97.33 (80.54)	97.66 (81.28)
Fenvalerate (0.01)	88.33 (70.03)	90.00 (71.57)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	100.00 (88.19)	97.66 (81.28)	98.00 (81.87)
Control	1.66 (7.04)	3.33 (10.52)	10.00 (18.43)	13.33 (21.42)	13.33 (21.42)	15.00 (22.79)	7.66 (16.11)	10.33 (18.72)
Mean	76.66 (61.14)	76.66 (61.14)	87.14 (68.95)	86.66 (68.61)	87.61 (69.64)	87.85 (69.64)		

EP = *Encarsia perniciosi*AP = *Aphytis proclia*

Treatments

*E. perniciosi**A. proclia*

± SEM

CD (P=0.05)

± SEM

CD (P=0.05)

Insecticides

0.70

2.03

0.570

1.612

Periods

0.54

1.52

0.138

0.390

Periods x

Insecticide

NS

NS

NS

NS

REFERENCES

- BHAGAT, K.C., MASOODI, M.A. and KOUL, V.K. 1988. A note on the occurrence of coccinellid predator in Kashmir. *Curr. Res.*, 17, 49-51.
- HASSAN, S.A. 1983. Procedures for testing the side effects of pesticides and beneficial arthropods as being considered by the International Organisation for Biological control, International Working Group "Pesticides and Beneficial Asthropods" *Mitteilungen der Deutschen Gesellscharft fur Allgemeiner and Angewanate Entomologic* 4, 88
- HASSAN, S.A., ALBERT, R., BIGLAR, F., BLAISINGER, P., BOGENSCHUTZ, H., BOLLER, E., BRUN, J., CHIVERTON, P., EDWARDS, P., ENGLER, W.D., HAUN G.P., INGLESFIELD, D., MATON, E., OOMEN, W., OVERMEER, J., RIECHMANN, W., SAMSOE, PETERSEN, I., STUBLI, A., TUSET, J.J., VIGGIANI, G., and VANWETSIVINKEL, G. 1987. Results of third joint pesticide testing programme by the International organisation for biological control working Group "Pesticides and Beneficial Organisms". *J. Appl. Entomol.*, 103, 92-107.
- KERR, R.W. 1948. The effect of starvation on the susceptibility of house flies to pyrethrum sprays. *Australian J. Scientific Res.*, (B) 1, 76-92.
- MASOODI, M.A. and TRALI, A.R. 1987 Seasonal history and biological control of San Jose scale *Quadraspidiotus perniciosus* (Comstock) (Homoptera : Diaspidae) on apple in Kashmir. *J. Biol. Control*, 1, 3-6.
- OOMEN, P.A. 1985. Guidelines for the evaluation of side effects of pesticides on *Encarsia formosa*. *Bull. European Pl. Protect. Org.*, 15, 257- 265.