J. ent. Res., 14 (1) : 5–7 (1990)

Shift in the level of susceptibility of *Myzus persicae* to some insecticides

S. DHINGRA

Division of Entomology, Indian Agricultural Research Institute, New Delhi-110 012 (India)

ABSTRACT : The toxicity of commonly used seven insecticides was evaluated against *Myzus persicae* Sulz. to ascertain the trend of its susceptibility towards them. There has been a considerable shift in the level of susceptibility of *M. persicae* to insecticides during the past two decades. The LC_{50} values of phosphamidon, lindane and endosulfan increased 155, 30 and 21 times. However, no such shift was evident in the case of pyrethrum.

The tobacco aphid, *Myzus persicae* Sulz. is a serious pest of tobacco as also mustard, radish, peach, potato and other solanaceous crops (Bunzil and Buttiker, 1959). It is considered as the most potential vector of a number of important virus diseases (Verma and Mishra, 1975; Verma, 1977). The aphids severely stunt the growth of the young plant and cause yellowing of leaves. In older plants, withering of leaves may be caused by larger population of aphids. Severe infestation causes variable losses in both yield and quality (Dominick, 1949; Chamberlin, 1958). A sudden outbreak of *M. persicae* during Jan-March, 1988 at the farm of Indian Agricultural Research Institute, New Delhi, led to investigate the toxicity of recently introduced synthetic pyrethroid cypermethrin along with other insecticides used earlier to determine the change in its susceptibility, if any, over the last two decades.

MATERIAL AND METHODS

The details of different insecticides and their source of supply are given in earlier publications (Sarup *et al.*, 1969; Dhingra and Singh, 1988). All the technical grades of insecticides were made into emulsions using benzene as solvent and triton x-100 as emulsifier. The solvent and emulsifier in the final spray were maintained at 5.0 and 0.625 per cent, respectively. The aphids collected from the farm of the Division of Entomology, Indian Agricultural Research Institute, New Delhi, were pre-conditioned in the laboratory at 27± 1°C for four hours. Ten apterous viviparous adult females were placed in a petri dish (10 cm dia.) sprayed directly under Potter's tower with one ml of each concentration of different insecticides at 24 cm mercury level. The petri dishes containing treated aphids were dried under ceiling fan for five minutes, following which the insects were transferred to separate glass tubes (10 cm × 4 cm) containing fresh, untreated cabbage leaves as food. The tubes were covered with muslin and kept at 27 ± 1°C for taking mortality counts 24 h after treatment. The moribund insects were considered as dead. There were three replications for each concentration and untreated control. Mortality in the case of untreated aphids ranged from 0.0 to 10.0 per cent. This was later corrected for various insecticidal concentrations by Abbott's formula (1925). The data so obtained were subjected to probit analysis (Finney, 1971) for calculating regression equations and LC_{50} values.

RESULTS AND DISCUSSION

Only five insecticides, viz., cypermethrin, pyrethrin, monocrotophos, phosphamidon and fenitrothion proved to be more toxic than lindane, being 21.97, 15.13, 4.45, 3.53 and 3.09 times respectively as toxic as lindane. Endosulfan was less toxic than lindane, being 0.46 times as toxic as lindane (Table1).

Table 1. Relative toxicity of some important insecticides to the adults of *Myzus persicae* Sulz.

Insecticide	Heterogeneity*	Regression equation	LC_{50}	Fiducial limits	Relative toxicity
Cypermethrin	5 = 2.341	1.7723x + 0.2363	0.004874	0.006128 0.003877	21.97
Pyrethrin	4 = 3.831	1.6963x + 0.1658	0.007076	0.009183 0.005451	15.13
Monocrotophos	4 = 5.681	1.7670x – 0.9775	0.02408	0.031700 0.018390	4.45
Phosphamidon	4 = 3.276	1.4319x + 0.0139	0.03035	0.040500 0.022750	3.53
Fenitrothion	5 = 9.079	1.6707x – 0.9143	0.03467	0.044550 0.026990	3.09
Lindane	4 = 5.043	2.0259x – 3.1638	0.10710	0.135800 0.084410	1.00
Endosulfan	4 = 4.088	1.8305x – 2.9847	0.23010	0.291500 0.181800	0.46

* In none of these cases, the data were found to be significantly heterogeneous at P = 0.05; Y = Probit kill, x = log (conc. × 10^5), LC_{50} = Concentration calculated to give 50 per cent mortality.

As early as 1967, Sarup and coworkers determined the LC_{50} values of different pesticides as contact poison against the adults of *Myzus persicae*. Again, during 1988, the toxicity of seven commonly used insecticides were evaluated to ascertain the trend of its susceptibility to these insecticides. Thus, during the past two decades, there has been a considerable shift in the level of susceptibility to phosphamidon, lindane and endosulfan. There was about 155, 30 and 21-fold increase in the LC_{50} values of these insecticides, respectively. On the other hand, the toxicity of pyrethrin to *Myzus persicae* remained more or less the same, the LC_{50} values being 0.009759 in 1967 and 0.00707 worked out during 1988 (Table 2).

Table 2. Relative susceptibility of some insecticides to *Myzus persicae* Sulz.

Insecticide	LC_{50} (1988)	LC_{50}* (1967)	Relative susceptibility
Phosphamidon	0.03035	0.0001954	155.32
Lindane	0.10710	0.003538	30.27
Endosulfan	0.23010	0.010620	21.67
Pyrethrin	0.007076	0.009759	0.72

* Sarup *et al.* (1967)

$$\text{Relative susceptibility} = \frac{LC_{50} \text{ worked out in the present investigation (1988)}}{LC_{50} \text{ worked out during 1967}}$$

REFERENCES

Abbott, W. S. 1925. A method of computing the effectiveness of an insecticide. *J. econ. Ent.*, **18** : 265 - 267.

Bunzil, G. H. and Buttiker, W. W. 1959. Host plants of *Myzus persicae* Sulz. with a list of aphids of common occurrence in the tobacco growing districts of S. Rhodesia. *J. ent. Soc. S. Afr.*, **22** : 35 - 50.

Chamberlin, F. S. 1958. History and status of the green peach aphid, *Myzus persicae*, as a pest of tobacco in the United States. *Tech. Bull. U. S. Dept. Agric.*, No. 1175 : 12 pp.

Dhingra, S. and Singh, D. S. 1988. Impact of formulation on the level of resistance in mustard aphid, *Lipaphis erysimi* Kalt. to synthetic pyrethroids. *J. ent. Res.*,**12** (1) : 56-60.

Dominick, C. B. 1949. Aphids on flue-cured tobacco. *J. econ. Ent.*, **42** : 59-62.

Finney, D. J. 1971. Probit Analysis. Cambridge University Press, Cambridge. 333 pp.

Sarup, P., Singh, D. S., Rattan Lal and Wadhwa, S. 1967. Testing of different pesticides as contact poisons against the adults of *Myzus persicae* Sulz. (Homoptera : Aphididae). *Indian J. Ent.*, **29** (1) : 84-91.

Sarup, P., Singh., D. S., and Rattan Lal, 1969. Testing of different insecticides as contact poisons against the adults of mustard aphid, *Lipaphis erysimi* Kalt. (Homoptera : Aphididae). *Indian J. Ent.*, **31** (1) : 21-25.

Verma, K. D. 1977. Aphids and their role in potato cultivation, 256-260 pp. Recent Technology in Potato Improvement and Production, (Ed.), B. B. Nagaich, Central Potato Research Institute, Shimla.

Verma, K. D. and Mishra, S. S. 1975. Be on watch for green peach aphid. *Indian Fmg.*, **25** (3) : 7-8.

(Accepted : January 15, 1990)