Agric. Res. J. Kerala 30 (1992) : 132 - 134

ORIENTATIONAL RESPONSE OF LEAF HOPPERS, EPILACHNA BEETLES AND APHIDS TO BRINJAL PLANTS TREATED WITH THE SUBLETHAL CONCENTRATIONS OF DECAMETHRIN AND CARBARYL

Whenever scheduled applications of insecticides are adopted as a routine practice, the tendency to apply sublethal concentrations has become quite common among the farmers. Practically very little information is available on the influence of sublethal doses of insecticides on the orientational response of insects.

Laboratory studies were carried out to evaluate the effect of sublethal doses of decamethrin and carbaryl on the orientation of the three secondary pests of brinjal namely, the leaf hopper *Amrasca biguttula biguttula* Ishida, the epilachna beetle *Henosepilachna 28 punctata* (Fabr) and the aphid *Aphis gossypii* Glover. Good stock cultures of the test insects were maintained and LC 5, 10, 25 and 50 values for both the test insecticides were computed adopting the standard procedure (Finney, 1952).

To assess the orientational response of *H. 28 punctata* towards the plants treated with the sublethal concentrations, the experiments were conducted in field cages (size 180 x 90 x 90 cm) containing potted plants. Eight of the one month old potted plants were treated each with 25 ml of the four sublethal concentrations of the two test insecticides using an atomizer. There were two controls, one with water spray and another with benzene emulsion water. Fifty numbers of one day old adults of *H. 28 punctata* starved for three hours were transferred to a petridish and kept open in the centre of the potted plants at the canopy level. The insects alighting in each of the potted plant were counted and collected using an aspirator at the end of 24 h. They were starved for a period of three hours and kept in petridishes in the centre of the cages for redetermining their orientational response. The plants in the cage were rearranged in another sequence before re-introduction of the test insects. The response of the insects towards both treated and control plants was thus recorded at intervals of 24 h for seven days. The experiment was replicated thrice.

To evaluate the orientational response of *A. gossypii*, fresh healthy leaves were collected and 2 ml of the sublethal dose of the insecticide was sprayed on the lower leaf surface. Benzene emulsion water and distilled water treated leaves served as controls. Treated leaves were air dried and then placed in a circular manner over a labelled glass trough (diameter 30 cm). One hundred last instar nymphs of the test insects were kept in the centre of the trough and they were forced to disperse by inducing the leaves to wither. The number of nymphs reaching the treated and control leaves at the end of 7 h was recorded to determine the orientational preferences of the aphids to treated leaf surfaces.

The experiments to determine the orientational response of *A. b. biguttula* were carried out in small field cages. Seedlings aged 25 days were sprayed with the sublethal doses of the insecticides and the root systems were im-

Table 1. Effect of sublethal concentrations of decamethrin and carbaryl on the orientational response of test insects

Insecticide	Lethal conc (LC)	Number of insects settling on treated brinjal plants		
		H.28 punctata	*A. gossypii*	*A.b. biguttula*
Decamethrin	5	12.90 d	13.67 a	7.80 a
	10	9.62 c	6.67 cd	4.10 bcd
	25	6.86 b	4.33 abc	4.17 bcd
	50	4.86 a	2.00 ab	1.97 ab
Carbaryl	5	13.57 d	13.33 a	4.93 d
	10	8.00 bc	8.00 d	3.27 abcd
	25	4.81 a	3.67 abc	2.10 abc
	50	4.09 a	1.00 a	1.63 a
Check (BEW)		17.62 a	22.00 f	9.30 ef
Check (Plain)		16.67 a	22.67 f	10.73 f

The values followed by common letter within a column are not significantly different at 5% level (DMRT)

mersed in water kept in conical flask of capacity 250 ml. These conical flasks containing the treated seedlings were then arranged in acircular manner inside the cage. Fifty adults aged 10 days were released in the centre of the cage. At the end of one hour, the numbers of insects actually colonising the treated plants and the control plants were recorded. At the end of 60 min, the plants were re-arranged and similar observations taken once again.

The response of *H. 28 punctata* resulted in adults alighting more on the untreated check plants than on the treated ones. Amog the different treatments, there was a significant diffrence between the number orientating towards lower and higher sublethal concentrations. In the case of decamethrin and carbaryl the number of H. *28 punctata* alighting on plants treated with LC_{50} concentrations was distinctly lower. As the toxicity of the substrates increased the insects might have been repelled following the chemosensory perception of the volatile components of the toxic compounds. The orientational response of *A. gossypii* was basically similar to H. *28 punctata.* The odour from the residues of both insecticides applied at their sublethal concentrations on the leaves did not elicit specific positive orientation response of aphids. The number of aphids alighting on treated leaves was significantly lower than that in control. Minimum number of aphids settled on leaves treated at LC_{50}. In respect of the number of *A. b. biguttula* alighting on treated leaves, the variation was significant. The number of hoppers settling on decamethrin treated leaves at LC_5 level was on par with the control with BEW. At LC_{50} of both insecticides, there was least attraction.

In the present studies, sublethal

concentrations of decamethrin and carbaryl did not reveal any positive orientational response to all the test insects, namely *H. 28 punctata, A. gossypii* and *A. b. biguttula* which clearly indicate that the odour emitted from residues of sublethal concentrations of insecticides is not capable of eliciting a positive orientational response. The present findings are in general agreement with the results obtained by Chelliah and Heinrichs (1980) for the brown plant hopper *Nilaparvata lugens.* Volney and Mc Dougell (1979), however, reported that permethrin acted as a motor stimulant to virgin females of the spruce bud worm *Choristoneura fumiferana.* The present study rules out any positive orientational response to plants receiving sublethal concentrations of these toxicants as a factor regulating resurgence of the insects studied.

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