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Research Note :

Genetic improvement in an egg parasitoid *T. chilonis* for tolerance to pesticides

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Bioassay tests in the laboratory were conducted to study the susceptibility of adult *T. chilonis* to different concentrations of endosulfan. The newly emerged F_1 progeny were subjected to increased concentration of endosulfan. It was found that after the treatment of adult *T. chilonis* with endosulfan for 15 generations, the LC_{50} values of endosulfan increased by 13.27 % from 0.0437 % of base colony (susceptible) to 0.0495% of selected F_{15} colony (tolerant). To study the mode of inheritance, the programme of back crossing was undertaken. LC_{50} values of back cross progeny obtained was 0.0476 % which was intermediate between susceptible (S) colony (LC_{50} 0.0437%) and F_{15} selected (R) colony (LC_{50} 0.0495 %) indicating that the gene for endosulfan tolerance is completely dominant.

Key words : Bioassay, *Trichogramma*, Tolerance, Inheritance, Backcrossing.

As the main component of integrated pest management, chemical and biological methods of pest control should be made compatible to each other. To tap 'Golden median' among them, chemical control methods showed be modified in such a way that it would be compatible to biological control method and vice-versa. The adverse effect of pesticides on natural enemies of pest may be reduced by developing specific target chemical pesticides safer to non-target organisms and natural enemies or by modifying natural enemies them self to suit chemical pesticides. The later involves the identification of field evolved pesticide resistant strains of the natural enemies of pests or artificially generating the resistant strain of bioagents in the laboratory. In the present study, the efforts have been made to elucidate the identification of artificially generating resistant strain of the *Trichogramma* to the endosulfan under the laboratory condition.

Laboratory selection of T. chilonis for tolerance to endosulfan :

Trichogramma chilonis was used for laboratory selection to endosulfan. The newly emerged F_1 progeny was subjected to increased concentration of endosulfan based on LC_{50} values obtained in bioassay tests. This was repeated upto 15 generations. The procedure for selection was carried out as per the method suggested by Rosenheim *et al.* (1989). Newly emerged parasitoids of mixed sex were kept for 24 hr in insecticide treated plastic bowl capped with insecticide treated polyester gauge. Insecticide concentrations were selected to provide adult mortality within 24 hr. Parasitoids surviving insecticide exposure were provided with excess of Corcyra eggs. These parasitoids were selected 14 times with endosulfan.

Mode of inheritance of tolerance of Trichogramma chilonis to endosulfan :

To study the mode of inheritance of tolerance of *T. chilonis* to endosulfan, the produce of backcrossing was carried out as per the method suggested by Herne and Brown (1969). Since the adults of *T. chilonis* are minute and difficult to identify their sex, single pair mating was not feasible for crossing colonies. During this programme of back crossing, the endosulfan tolerant 'R' strain which was selected upto 15 generations was back crossed to base colonies of susceptible 'S' strain. The F_1 of these crosses were maintained and their LC_{50} value was compared with selected 'R' colony and susceptible 'S' colony.

Selection of T. chilonis for tolerance to endosulfan in laboratory :

It was be seen that in the course of development of 15 generations of *T. chilonis*, the selected concentration of endosulfan was increased by 13.27 per cent. The LC_{50} value of endosulfan initially was 0.0437 per cent for base colony (S) of *T. chilonis*, which was found to 0.0495 per cent after 15 generation (Table 1). In the course of 15 generations the tolerance grew almost 1.34 times. In similar studies, Kot *et al.* (1977) obtained highest level of

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Table 1 : Susceptibility of base (S) colony F_{15} (R) colony and backcross progeny *T. chilonis* to endosulfan

S. No.	Insecticide	LC_{50} (%)	Slope	Fiducial limit		Regression equation	Per cent increase in LC_{50} value over base colony (s)
				Upper	Lower		
1	Base (S) colony	0.0437	4.24680	0.0496	0.0385	Y = 3.5838x-4.4622	0
2	F_{15} (R) colony	0.0495	4.29690	0.0562	0.0435	Y = 3.5570 x – 4.5842	13.27
3	Backcross progeny	0.0476	4.34540	0.0541	0.0418	Y = 3.6013x-4.6420	8.92

resistance in *T. evanescens* upto 22 times that of the control (unexposed) strains in 34th generation.

Study on inheritance of endosulfan tolerance in T. chilonis :

LC_{50}value of backcross progeny was 0.0476 per cent, base colony (s) 0.0432 per cent and F_{15} selected colony (R) 0.0495 per cent (Table 1). The tolerance of backcross progeny was increased by 8.9 per cent over that of base colony (s), which may give some information on the character of inheritance. The increase in tolerance to endosulfan in reciprocally crossed progeny clearly indicate that the factor for tolerance is completely dominant. The literature on mode of inheritance of pesticide resistance in bioagents in general and *Trichogramma* spp. in particular is lacking. However, Spollen and Hoy (1993) found that resistance of progeny obtained by crossing 'R' and 'S' colony of *Aphytis melinus* was intermediate between the parents.

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