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# Effect of Insecticides on the Survival and Emergence of Egg Parasite, *Trichogramma* spp.

By

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ABSTRACT

Studies were made on the effect of five common insecticides viz., endrin 0.1%, parathion 0.05%, malathion 0.1%, endosulfan 0.1% and lindane 0.1% on the survival and emergence of the two egg parasites viz. *Trichogramma australicum* Gir and *Trichogramma japonicum* Ashm. The mortality of the parasite was noticed upto 10 days in *T. australicum* as against 21 days in *T. japonicum* when allowed on sugarcane leaves sprayed with insecticides indicating the relative susceptibility of *T. japonicum* to the insecticides. Among the insecticides endosulfan and lindane were found to be least toxic to the parasites. The emergence of both the species of the parasites, though was not affected much due to surface spray application of the insecticides on the parasitised host eggs, parathion was found to affect emergence to a certain extent while the other insecticides tested recorded an emergence rate equal to that of the control.

## INTRODUCTION

In India, the egg parasite *Trichogramma australicum* Gir. multiplied in the eggs of the rice moth *Corcyra cephalonica* St. and released for the control of sugarcane shoot borer *Chilo infuscatellus* Snell. and the stem borer *Chilo indicus* (Kapur). As generally insecticides are applied on sugarcane crop for the control of borer pests, an understanding of the effect of such insecticides on the emergence and survival of the egg parasites is essential. Such a knowledge would be useful in an integrated approach to pest control problems in sugarcane crop. With this in view a study was undertaken in the laboratory to assess the effect of few chemicals on the emergence and survival of the egg parasites *T. australicum* and *T. japonicum*.

## MATERIALS AND METHODS

Five insecticides viz., parathion 0.05%, lindane 0.1%, malathion 0.1%, endrin 0.1% and endosulfan 0.1%, were sprayed on potted sugarcane plants of uniform age with an atomizer and kept under glass house conditions. From these plants, leaf samples were drawn every day for bioassay on the parasites. The leaves were cut into 4 x 2.5 cm six bits in which the host eggs were glued. Each bit was kept in a specimen tube and ten parasites were introduced into it. Dilute honey was kept in each tube as adult food. This was replicated five times. The number of

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adults died after 24 hours of introduction was recorded to assess the effect of insecticides on the survival of the parasites.

The effect of these insecticides on the emergence of the parasites was also studied under laboratory conditions. The parasitised eggs at different stages of development were sprayed with these insecticides in a Potter's Tower. The parasitised egg samples were taken at 24 hours interval from the time of parasitisation upto the date of emergence. Ten eggs were taken in each treatment and the experiment was replicated five times. The number of adults that emerged was recorded.

## RESULTS AND DISCUSSION

**Effect of insecticides on the survival of the parasite:** The values of mean percentage of mortality of the parasites under the different treatments upto 10 days in *T. australicum* and upto 21 days in *T. japonicum* are given in Table.

The mortality of *T. australicum* was appreciably high upto seven days after the application of insecticides. The maximum mean mortality was noticed a day after application (66.08%) and thereafter there was a steady decline in the mortality rate. Though minimum mortality was observed 10 days after spraying, the insecticides had no effect on the parasites from the 11th day onwards. Among the insecticides tested, endosulfan and lindane were found to be less toxic to the parasites recording a mean mortality rate of 1.26 and 4.95% respectively, as against 62.39 to 65.66% in other insecticides.

In the case of *T. japonicum* the chemicals affected the survival of the parasite upto 21 days after application of insecticides and thereafter the insecticides had no effect. The mortality of the parasite was appreciably high upto 16 days after application, though the mortality of the parasite was heavy in the first 10 days after spraying. Among the five insecticides tested endosulfan was found to be the least toxic to the parasites followed by lindane and malathion, while parathion and endrin were found to be highly toxic.

In the case of *T. australicum* the mortality of the parasites was noted upto 10 days as against 21

TABLE. Mean percentage mortality of the egg parasites

| Name of the parasite | Endrin | Parathion | Endosulfan | Malathion | Lindane | C. D. (P=0.05) |
|---|---|---|---|---|---|---|
| *T. australicum* | 62.39 | 63.37 | 1.26 | 65.66 | 4.95 | 2.48 |
| | (7.00) | (7.03) | (0.98) | (7.33) | (1.61) | |
| *T. japonicum* | 76.36 | 77.29 | 6.27 | 42.15 | 23.04 | 0.27 |
| | (8.54) | (8.49) | (0.64) | (4.92) | (3.20) | |

Figures in parentheses are transformed values.

days in the case of *T. japonicum* which is an indication of the relative susceptibility of the parasite *T. japonicum* to the insecticides. Among the insecticides used, endosulfan and lindane were found to be least toxic to the parasites having deleterious effect upto only 3 and 4 days respectively in the case of *T. australicum* and 9 and 10 days in *T. japonicum*. This is in agreement with the findings of Rattan Lal and Prakash Sarup (1970) who had reported that the insecticides lindane, diazinon, rotenone and endosulfan were less toxic to the mite predator *Stethorus paupereulus* Weise. Thobbi (1970) observed the selective action of the insecticides carbaryl and endosulfan on the castor semilooper *Achaea janata* Linn. leaving its egg parasite *Telenomus* sp. unaffected. Singh (1970) also reported the relatively low toxicity of the insecticide endosulfan to the bees, wasps and other beneficial insects.

**Effect of insecticides on the emergence of the parasite:** The data were gathered on the emergence of the parasites *T. australicum*, 1, 2, 3, 4, 5 and 6 days after spraying and that of *T. jpaonicum* 12 hours, 1.5, 2.5, 3.5, 4.5, 5.5, 6.5 and 7.5 days after spraying. The mean percentage of emergence of the parasite *T. australicum* treated with the insecticides endrin, parathion, malathion, endosulfan, lindane and also for the untreated control were 84.00, 74.66, 86.00, 81.67, 86.00 and 84.33 respectively. The mean percentage of emergence of the parasites on different days after spraying *viz.*, 1, 2, 3, 4, 5 and 6 days are 84.67, 78.67, 75.00, 80.67, 89.00 and 88.67 respectively.

In the case of *T. japonicum* the mean percentage of emergence of the parasites for the different chemicals *viz.*, endrin, parathion, endosulfan, malathion, lindane and control were 77.00, 73.00, 82.75, 83.25, 76.00 and 88.00 respectively. The percentage of emergence of the parasites on different days *viz.*, 12 hours, 1.5, 2.5, 3.5, 4.5, 5.5, 6.5 and 7.5 days after spraying are 76.00, 66.00, 80.67, 79.67, 86.67, 82.36, 88.66 and 78.66 respectively.

In both the species the emergence of the parasites decreased in parathion treatment being 73.00 and 74.66 per cent respectively in *T. japonicum* and *T. australicum*. Though there was some difference in the emergence of the parasites between the different insecticidal treatments like endrin, endosulfan, malathion, lindane and parathion, they were found to be on par in their effect. The data thus indicate that the emergence of the parasites was not affected markedly due to the application of the insecticides *viz.*, endrin, parathion, endosulfan, malathion and lindane during the development of the parasites in both the species. Comparatively low percentage was noticed from host eggs sprayed with the insecticides just prior to emergence i.e., in the later stages of development of the parasites.

Among the insecticides used, parathion was found to affect the emergence of both the species of the parasites to a certain extent. A similar finding that the emergence of *Tricho-*

*gramma minutum* Riley is affected by parathion sprays has been reported by Ingram *et al.*, (1948). All the other insecticides tested recorded an emergence rate equal to that of control indicating that these insecticides had no effect on the emergence of both the species of the parasites. This may possibly be due to the protection given by the chorion of the host egg as suggested by Hoskins (1940). In both the species of the parasites lower percentage of emergence noticed from the host eggs sprayed with the insecticides one or two days prior to emergence. Higher percentage of emergence noted in the later stages may possibly be due to the loss of the insecticides due to the environmental factors.

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