

RELATIVE TOXICITY OF INSECTICIDES TO ADULTS OF *TRICHOSPILUS PUPIVORA* (FERRIERE)*

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For over twenty years now, *Nephantis serinopa*, the leaf eating caterpillar of coconut, is being controlled using some of its parasites. But on occasions, when the climate becomes unfavourable for the survival of the parasites, the population of the caterpillar increases considerably and it becomes difficult to bring down the population even by repeated liberation of the parasites. It then becomes necessary to apply an insecticide for the immediate suppression of the pest population. The insecticides will destroy the parasites also resulting in the resurgence of the pest. This can be avoided by proper integration of the chemical and biological methods of control. One of the methods of integration is by using insecticides which are less toxic to the parasites.

Trichospilus pupivora (Eulophidae) is one of the most effective parasites of *Nephantis serinopa* and which is used extensively for applied biological control of the pest. The only information available on the toxicity of insecticides to this parasite is that derived from the work of Nirula *et al* (1958). They found that residues of DDT sprayed on coconut leaves remained toxic to the parasite to a considerable extent, upto eight weeks after application, while

residues of BHC were more or less completely lost in five to six days after spraying. At present quite a number of other insecticides with wide ranging properties are available for insect control. The present studies were undertaken to evaluate the relative toxicity of different insecticides to adults of *T. pupivora*, since no information is available on it at present and since this information may ultimately help in integrating chemical and biological methods, to control *Nephantis serinopa*.

Materials and Methods

All the insecticides were used as emulsions, prepared either from technical materials using benzene as solvent and Triton X-100 as emulsifier, or from commercial emulsifiable concentrates as the case may be. The insecticides, whose technical materials were used, were, DDT, BHC, lindane, endrin, parathion, malathion, sevin, thiodan (endo-sulfan) and dipterex. The insecticides, whose proprietary emulsifiable concentrates were used were, formothion (Acthio of Sandoz Ltd., 25% E. C.) dichlorvos (Nuvan of Ciba, 100% E. C.) phosphamidon (Dimecron of Ciba, 100% solution), imidan

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(of Stauffer, 30% E. C.), dimethoate (Rogor of Tata Fison, 30% E. C.) thiometon (Ekaton of Sandoz, 20% E. G) and trithion (of Stauffer, 20% E. C).

Trichospilus pupwora, the test insect was reared in the laboratory using pupa of *Pfytometra peponis* as alternate host. Adults of *T. pupivora* which had emerged on the same day were used for these experiments. Both males and females were used; sex was of no consideration in the present studies. The parasites were not fed before being used.

Toxicity of the different insecticides to the parasite was determined by exposing adults of the parasite to films of the insecticides in petridishes and observing the time-mortality relationship between the parasite and the insecticide films. The insecticide film was prepared by spraying the petridish with the emulsion under a Potter's spraying tower and drying it under laboratory conditions. Each petridish was sprayed with 1 ml of the concerned insecticide emulsion containing 0.01% of the active ingredient. The outer side of the rim of the petridish was covered with black paper. The dishes were then placed inverted on a glass plate covered with black paper. The parasites were introduced into the dishes and since they were positively phototropic, they immediately moved on to the upper surface of the dishes, which bears the insecticide film. Each treatment was replicated thrice using twenty parasites for each replication. The insects were kept in continuous contact with the insecticide film.

Mortality counts of the parasites were taken at regular intervals after exposing them to the insecticide film. Toxicity of the insecticides was determined in terms of LT. 50 i.e., the time required to cause 50% mortality among the parasites. This was calculated using the Probit analysis technique (Finney, 1952).

Results and Discussion

Results are given in table I which is a consolidated statement of X^2 which indicates the heterogeneity of the data, the regression equation, LT.50 and fiducial limits of LT.50s of the different insecticides. Relative toxicity of the insecticides also is given and this has been calculated by comparing the LT.50s of the various insecticides, with that of DDT, which is taken as one.

It will be observed that dipterex, diazinon and dichlorvos are less toxic than DDT being 0.4663, 0.5360 and 0.5421 times as toxic as DDT. Thiodan, malathion, sevin, BHC, formothion, parathion, trithion, imidan, rogor and phosphamidon are respectively 1.276, 2.161, 2.191, 2.932, 3.347, 3.899, 4.674, 6.105, 7.513, and 8.531 times as toxic as DDT. Lindane and endrin are respectively 13.25 and 13.76 times as toxic as DDT to the parasite. Thus among the seventeen insecticides tested, dipterex, diazinon and dichlorvos appear to be the least toxic and lindane and endrin. the most toxic.

TABLE 1

Relative toxicity of different insecticides to adults of *Trichospilus pupivora* *

| Insecticides | LT• 50 in hours | Fiducial limits of Lt • 50 in hours | Relative toxicity |
|---------------------|-----------------|--|----------------------|
| Dipterex | 21.59 | 21.64 21.54 | 0.4663 |
| Diazinon | 18.78 | 18.80 18.75 | 0.5360 |
| Dichlorvos | 18.57 | 18.87 18.27 | 0.5421 |
| DDT | 10.07 | 10.67 9.506 | 1.000 |
| Thiodan | 7.891 | 8.063 7,720 | 1.2760 |
| Malathion | 4.6583 | 3.040 4.304 | 2.1610 |
| Sevin | 4.595 | 4.634 4.563 | 2.1910 |
| BHC | 3.4333 | 3.469 3.398 | 2.9320 |
| Formothion | 2.92 | 2.923 2.917 | 3.3470 |
| Parathion | 2.5817 | 2.589 2.574 | 3.8990 |
| Trithion | 2.154 | 2.162 2.149 | 4.6740 |
| Imidan | 1.6488 | 1.649 1.647 | 6.1050 |
| Rogor | 1.3398 | 1.341 1.339 | 7.5130 |
| Phosphamidon | 1.1802 | 1.98 1.162 | 8.5310 |
| Lindane | 0.7595 | 0.7621 0.7568 | 13.25 |
| Endrin | 0.7J17 | 0.7345 0.7288 | 13.76 |

* The experiments were done during the period 29-10-1965 to 10-2-1966. All the experiments were conducted under laboratory conditions with temperature 27—31°C. and relative humidity 86- 90% •

Summary

Toxicity in terms of L. T. 50 of 17 insecticides to adults of *Trichospilus pupivora* has been ascertained by exposing the adult parasites to films of the insecticides deposited on petri dishes from emulsions of 0.01% concentration. The order of toxicity was Dipterex \angle Diazinon \angle Dichlorvos \angle DDT \angle Thiodan \angle Malathion \angle Sevin \angle BHG \angle Formothion \angle Parathion \angle Trithion \angle Imidan \angle Rogor \angle Phosphamidon \angle Lindane \angle Endrin.

Dipterex, Diazinon, and dichlorvos are less toxic to the parasite than DDT, being 0.4663, 0.5360 and 0.5421 time as toxic as DDT. Thiodan, malathion, sevin, BHC, formothion, Parathion, trithion, imidan, rogor, phosphamidon, lindane and endrin are more toxic than DDT being respectively 1.276, 2.161, 2.191, 2.932, 3.347, 3.899,

4.764, 6.105, 7.513, 8.531, 13.25 and 13.76 time as toxic as DDT to the parasites •

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