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# Antifeeding Effects of Two Organotin Compounds on *Stomopteryx subsecivella* Zell. (Lepidoptera)*

BY

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ABSTRACT

Laboratory and field experiments conducted against the leaf folder *Stomopteryx subsecivella* on groundnut indicated the usefulness of TPTA and TPTH at 0.5 per cent in reducing the incidences of the pest and the feeding damage, resulting in the increase of yield also. Among the insecticides, quinalphos ranked superior in pest reduction while monocrotophos recorded significant pest reduction combined with increase in yield.

## INTRODUCTION

The wide spread and indiscriminate use of highly toxic substances in the chemical control of insects in the recent years resulted in several problems such as insect resistance to pesticides, toxic residue problems on food crops and environmental pollution. One of the recent approaches in overcoming these problems is the use of antifeeding compounds. Lange (1962) and Wright (1963) outlined the role of antifeedants in reducing crop losses caused by chewing insects. In India studies on the fundamental aspects on these chemicals and their practical application in crop protection are very limited. The present paper deals with the results of laboratory and field experiments with antifeedants and insecticides against the peanut leaf folder *Stomopteryx subsecivella* conducted at Tamil Nadu Agricultural University, Coimbatore.

## MATERIALS AND METHODS

For testing the efficacy of TPTA (Brestan 60 per cent W. P.) and TPTH (Du-Ter 20 per cent W.P.), a laboratory experiment was conducted with the concentrations of these chemicals ranging from 0.01 to 0.10 per cent. The larvae of *S. subsecivella* approximately 8-9 days old (7-8 mm long), were collected from the field, fed with fresh peanut leaves and conditioned for 2 hr in a chamber at 25°C before commencing the feeding experiment. These caterpillars were enclosed in petridishes with damage free leaflets, after dipping them with various concentrations of the two compounds. The leaves folded and the leaf folds fed by the

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larvae from inside were assessed after 48 hr and expressed as percentage over control.

Three field experiments were also conducted in Coimbatore District during 1973. The incidence of other pests was negligible and natural enemies on *S. subsecivella* were rarely prevalent in the fields. In each trial the treatments consisted two antifeeding compounds *viz.*, TPTA and TPTH in two concentrations and eight organic synthetic insecticides and a control as furnished in Table II. The trials were in randomised block design replicated thrice with Pol 1 in two trails and TMV 7 in the third trial. The first and second round of treatments were given on 30 and 50th day of sowing with 800-1000 litres of spray liquid per hectare. Observations on the number of leaf folds with the insect in each plot were taken in one square meter area before giving each round of treatments and the final assessment was done 20 days after second spraying. The yield data of fresh pods were recorded from I and II trials only as the crop in the III trial failed.

TABLE I. Efficacy of different concentrations of TPTA and TPTH on leaf folding and feeding by *S. subsecivella*

| Concentration (%) | TPTA | | TPTH | |
|---|---|---|---|---|
| | Leaf folds (%) | Leaf folds with feeding marks (%) | Leaf folds (%) | Leaf folds with feeding marks (%) |
| 0.01 | 98.0 | 48.0 | 91.0 | 47.0 |
| 0.02 | 46.0 | 31.0 | 37.0 | 25.0 |
| 0.03 | 31.0 | 7.0 | 28.0 | 5.0 |
| 0.04 | 26.0 | 4.0 | 21.0 | 3.0 |
| 0.05 | 12.0 | 0 | 10.0 | 0 |
| 0.06-0.08 | 9.0 | 0 | 6.0 | 0 |
| 0.09-0.10 | 0 | 0 | 0 | 0 |

## RESULTS AND DISCUSSION

The data in Table I revealed that maximum and minimum leaf folding were 98.0 and 9.0 per cent and 91.0 and 6.0 per cent in 0.01 and 0.08 per cent doses at TPTA and TPTH respectively. At the highest two doses *viz.*, at 0.09 and 0.10 per cent there were no leaf folds and this might be due to the perception of the higher concentration of antifeedant by the larvae on the foliar surface, inhibiting even the production of salival thread required for leaf folding. Similarly, the feeding activity was maximum *viz.*, 48.0 and 47.0 per cent at 0.01 and minimum *viz.*, 4.0 and 3.0 per cent at 0.09 per cent doses of TPTA and TPTH respectively. However total feeding inhibition was observed at 0.05 to 0.10 per cent doses of both the compounds.

The incidence data in terms of leaf folds with larvae and yield increase over control are furnished in Table II. The pooled analysis of the data showed that all the chemicals significantly reduced the pest incidence and also in-

TABLE II. Efficacy of antifeedants and insecticides against peanut leaf folder

| Treatments | No. of leaf folds with larvae | | | | Yield increase over control (%) | | |
|---|---|---|---|---|---|---|---|
| | Trial 1 | Trial 2 | Trial 3 | Mean | Trial 1 | Trial 2 | Mean |
| TPTA (Brestan) 0.05% (0.50 kg a.i/.ha) | 7.0 | 182.0 | 31.9 | 73.63** | 72.4 | 106.2 | 89.30 |
| TPTA (Brestan) 0.025% (0.25 kg a.i./ha) | 4.0 | 108.0 | 18.0 | 43.33* | 46.5 | 53.1 | 49.80 |
| TPTH (Du-Ter) 0.05% (0.50 kg a.i./ha) | 7.0 | 139.0 | 64.6 | 70.20** | 55.1 | 109.3 | 82.20 |
| TPTH (Du-Ter) 0.025% (0.25 kg a.i./ha) | 11.0 | 58.0 | 32.9 | 37.30* | 29.3 | 53.1 | 41.20 |
| Dicrotophos (Bidrin) (0.5 kg a.i./ha) | 5.3 | 41.2 | 12.3 | 19.60 | 41.3 | 96.8 | 69.05 |
| Chlorfenvinphos (Birlane) (0.6 kg a.i./ha) | 3.6 | 31.2 | 10.0 | 14.93 | 29.3 | 96.8 | 63.05 |
| Toxaphene+DDT (Heliotox 4.0 l/ha) | 3.6 | 40.6 | 8.0 | 17.40 | 46.5 | 87.5 | 67.00 |
| Dimethoate (Rogor) (0.6 kg a.i./ha) | 7.3 | 53.3 | 11.0 | 23.86 | 24.1 | 87.5 | 55.87 |
| Quinalphos (Ekalux 4 l/ha) | 4.6 | 25.0 | 8.2 | 12.60 | 25.8 | 81.2 | 53.50 |
| Monocrotophos (Azodrin 1.6 l/ha) | 2.6 | 35.3 | 10.9 | 16.26 | 60.3 | 93.7 | 77.00 |
| Fenitrothion (Sumithion 2 l/ha) | 6.3 | 38.3 | 15.6 | 20.06 | 67.2 | 56.2 | 61.70 |
| Endosulfan (Thiodan 3 l/ha) | 5.7 | 58.0 | 32.0 | 31.90 | 29.3 | 75.0 | 52.15 |
| No treatment—Control | 99.7 | 272.0 | 233.3 | 201.66 | — | — | — |
| C. D. (0.05) | 9.30 | 30.5 | 18.44 | 43.40 | 41.12 | 4.60 | 26.41 |

* Feeding marks in a maximum of 25 per cent of leaf folds
** Feeding marks in a maximum of 10 per cent of leaf folds

creased the yield when compared to untreated control. The mean pest incidence ranged from 12.60 to 201.66 recorded by quinalphos and control treatments respectively. Among the antifeedants, the higher concentrations were not in any way superior than the lower doses in relation to pest incidence. Nevertheless, the feeding activity was very much low in both concentrations and the reduction in feeding symptoms ranged from 75-90 per cent in two doses of TPTA and TPTH. Moreover the mean maximum yield increase was found to be 89.3 and 82.27 per cent in TPTA and TPTH respectively than control at 0.05 per cent dose followed by monocrotophos, dicrotophos, toxaphene+DDT, chlorfenvinphos, fenitrothion, dimethoate, quinalphos, endosulfan, TPTA 0.025 per cent and TPTH 0.025 per cent.

The efficacy of the antifeedants inhibiting the feeding by the larvae in the present laboratory study is in confirmation with the findings on various test insects (Ascher and Rones, 1964; Ascher and Nissim, 1965; Findlay, 1969). Abdul Kareem (1970) and Joshi *et al.*, (1967) observed the organotins to be very effective at higher concentrations as is reported in the present study.

The field trials consisted many of the insecticides that were recently concluded to be effective against peanut leaf folder (Abdul Kareem *et al.*, 1972-73) along with the two antifeedants which are very commonly used against crop pests in the laboratory at present. Wright (1967) pointed out that antifeedants with adequate coverage would limit feeding damage more effectively than conventional insecticides which became evident in the present field trials also. This damage protection-factor was mainly responsible for enhanced yield in TPTA and TPTH at 0.05 per cent doses when compared with insecticides and control. In this respect Findlay (1968) reported TPTA and TPTH at 0.05 per cent were effective against *Plutella maculipennis* C. and compared favourably with thiodan. Besides, Addy and Dash (1966) reported that these compounds were very promising against 'tikka' a serious leaf spot disease on peanut plants caused by *Cercospora* sp. Hence it is concluded that the two antifeedants used in the present experiments played an important role in not only reducing the pest incidence and feeding damage but also in suppressing leaf disease, thus amounting to the increased yield.

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