

FIELD EFFICACY OF MALATHION, DIMILIN AND ATABRON AGAINST AMALTAS LEAF STITCHER *PIESMOPODA OBLIQUIFASCIELLA* L.

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Abstract

Malathion 57EC, Dimilin 25WP and Atabron 5EC were tested for their efficacy against *Piesmopoda obliquifasciella* in the field. Trials were conducted in randomized complete block design with three replications. Malathion @ 0.05%, 0.1% and 0.2% gave 58.32, 78.52 and 82.59% and 71.2, 86.49 and 87.50% mortality after 24 hours and two weeks of spray, respectively against zero percent natural mortality (corrected mortality after Henderson and Tilton's formula) Dimilin caused 47.29, 66.94% and 84.54, 88.14% mortality after one and two weeks of spray at 0.025 and 0.05% concentrations, respectively. Similarly 58.16, 73.17% and 80.38, 89.36% mortality was recorded against Atabron at 0.025 and 0.05% concentrations after one and two weeks of treatment against zero percent natural mortality. On the basis of these findings, Malathion @ 0.1%, Dimilin and Atabron @ 0.05% concentrations are suggested for effective and timely control of *P. obliquifasciella*.

Key words: *Piesmopoda obliquifasciella*, Amaltas leaf stitcher, Malathion, Dimilin, Atabron

Introduction

Amaltas leaf stitcher, *Piesmopoda obliquifasciella* is a key pest of amaltas, *Cassia fistula* at the University of Peshawar and Pakistan Forest Institute, campuses, Peshawar. Shah (1990) and Bajwa & Gul (1995) have reported more than 50-70% and 36-39% foliar damage, respectively. Heavy infestation left the leaves rusted and dirty giving bad appearance. Thus avenue value of the tree is impaired for which it is grown. Moreover, photosynthetic process is affected which leads towards stunted tree growth. It destroys annual growth of the tree to the extent of 50-100% depending upon the severity of infestation (Khawaja et al., 1982).

Khawaja et al. (1982) used an entomopathogenic fungus *Beauveria bassiana* (Bals.) Vuill. against the pest in the laboratory and obtained 72.5-97.5 percent larval mortality versus 50 percent natural mortality. Similarly, Khawaja, et al., (1983) secured 78.1-90.7 percent larval mortality of *P. obliquifasciella* in the

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laboratory with the help of Bactospeine (*Bacillus thuringiensis*) at the rate of 1.6×10^5 – 3.2×10^5 spores per ml against 34.4 percent natural mortality. However, there was no attempt to control this serious pest in the field.

Organo-phosphate pesticides and antimoultants are used against agricultural and forest insect pests worldwide. Malathion 57EC has been successfully tried against forest insect pests in Pakistan. For instance, spraying of Malathion @ half liter per hectare and flood irrigation alongwith Malathion application has successfully controlled *Tonica niviferana*, *Agrotis* spp. and *Euxoa* Spp., respectively (Chaudhry, 1988). But many insect pests have developed resistance against synthetic insecticides and Malathion is no exception (Kasana, et al, 1995). It was, therefore imperative to work out efficacy of different dose rates of Malathion in the field. Antimoultants (insect growth regulators) is a new group of insecticides, which is environmentally safer than other groups of insecticides. Hence these are used against forest insect pests particularly for controlling defoliators.

In Pakistan, antimoultants have been tried against various forest insect pests in different climatic zones. For example, Dimilin and Alsystin gave 93-100% mortality of *Biston regalis* (Kail defoliator) when used in 0.01, 0.02, and 0.04% concentrations (Chaudhry et al., 1984). Dimilin in laboratory as well as field trials, in doses of 0.02% and 0.04% concentrations gave cent percent mortality of the larvae of *Plecoptera reflexa* Guen. The residual effect of the insecticides continued up to about one month and provided cover for two successive and overlapping generations. Whereas, same insecticide gave 96% and 83% mortality of young and mature larvae of poplar defoliator *Ichthyura anastomosis* Steph, respectively at 0.04% concentration (Chaudhry and Gul, 1985). Likewise, Alsystin and Dimilin at the rate of 0.01, 0.02 and 0.04% caused 100% mortality in the larvae of *Euproctis lunata* Walk. with in 20 days (Rehman and Chaudhry, 1987). Keeping in view the successes of these insecticides against various forest insect pests, field efficacy trials of Malathion, Dimilin and Atabron were carried out against *P. obliquifasciella*

Materials and Methods

An Organo-phosphate pesticide-Malathion 57EC and two antimoultants namely, Dimilin 25WP (Diflubenzuran) and Atabron 5EC (PP-145) were evaluated for their efficacy in the field against the larvae of Amaltas leaf stitcher, *Piesmopoda obliquifasciella* L. (Pyrilidae: Lepidoptera). These trials were conducted at the Pakistan Forest Institute Campus, Peshawar.

I. Application of malathion

Malathion was sprayed in three doses, i.e. 0.05, 0.1 and 0.2% along with a control (0.0%) with the help of pneumatic knapsack sprayer. In control simple tap water was used. Twigs of 8-10cm dia. on two trees were sprayed per treatment per replication. Experiment with Malathion was carried out in randomized complete block design (RCBD) having four treatments including control with three replications. Observations on pest population were taken before the spray and after 24-, 48-, 72 hours, one- and two weeks of treatment.

II. Application of antimoultants

Dimilin and Atabron both were used at the rate of 0.025 and 0.5% concentration. Spray was done on twigs of 8-10cm dia. with the help of pneumatic knapsack sprayer. There were two trees per replication for each treatment. Simple tap water was utilized in control. There were five treatments including control (0.0%) which were replicated thrice in RCBD. Population of *P. obliquifasciella* was recorded before the spray and after one, two and four weeks of spray.

For both experiments, population of the pest was recorded on five pairs of stitched leaves from twigs of 2.0-2.5cm (dia.) and five times per tree. Population was calculated on per pair of stitched leaves. Method was adopted after Chaudhry and Bajwa (1993). In case of uneven distribution of population of *P. obliquifasciella* (larvae) in the field, percentage mortality caused by different test treatments was calculated by Henderson Tilton's formula as under (Akbar, et al., 1996).

Where T_a , population of insect after spray in the treated plots;

$$\% \text{ mortality} = 1 - \left(\frac{T_a}{C_a} \times \frac{C_b}{T_b} \right) \times 100$$

C_a , population of insect after spray in the untreated plots (Check);

T_b , population of insect before spray in the treated plot;

C_b , population of insect before spray in the untreated plots (check).

Mortality data were statistically analyzed through analysis of variance (ANOVA) and significance among different test treatments was determined by least significant difference test (LSD).

Results and Discussion

i. Efficacy of malathion 57EC

All the three test doses of Malathion caused highly significant larval mortality of *P. obliquifasciella*. Invariably the same pattern of dosage-mortality relationship was observed throughout observation period except after 72 hours. Data are presented in table 1.

Table 1. Mean mortality (%) of *P. obliquifasciella* on *C. fistula* at different post treatment intervals by different dose rates of Malathion 57EC

| Malathion Doses | Post Treatment Intervals | | | | |
|-----------------|--------------------------|----------|----------|---------|----------|
| | 24 hours | 48 hours | 72 hours | 1 week | 2 weeks |
| 0.05% | 58.32* b | 64.51 b | 68.55 b | 70.97 b | 71.20* b |
| 0.1% | 78.52 a | 80.86 a | 81.31 ab | 85.80 a | 86.49 a |
| 0.2% | 82.59 a | 83.66 a | 84.48 a | 86.47 a | 87.50 a |
| Check | 0.0 c | 0.0 c | 0.0 c | 0.0 c | 0.0 c |
| LSD | 13.49 | 8.90 | 14.7 | 8.77 | 5.34 |

- Significant at 99% level of significance
- Figures in the same column having same alphabets are non-significant (P 0.05) among themselves

Maximum mortality, viz. 82.59, 83.66, 84.48, 86.47 and 87.50% was recorded in Malathion at 0.2% concentration after 24 hour, 48 hour, 72 hour, one week and two week, respectively against zero percent mortality in control (corrected mortality after Henderson and Tilton's formula). The three Malathion doses namely, 0.05, 0.1 and 0.2% differed significantly among themselves in their mortality outcome. 0.1 and 0.2% have given results that were not significantly different. Difference in mortality incurred by 0.1 and 0.2% Malathion remained statistically non-significant after 24 hour, 48 hour, 72 hour, one week and two weeks. On the other hand, Malathion @ 0.05% gave significantly less mortality than the two higher doses (0.1 & 0.2%) except after 72 hours where difference in mortality was non-significant between 0.05 and 0.1%. Increment in mortality after 48 hour caused by Malathion @ 0.05% was 10.61%, While it was just 1.3% in Malathion at 0.2% concentration. Similarly, increase in mortality after one week was 21.69, 9.27, and 4.7% in the treatments of 0.05, 0.1 and 0.2% of Malathion, respectively. In these treatments, increment in mortality over the next one week period was marginal, i.e. 0.32, 0.8 and 1.19%. Higher doses caused

maximum mortality within first two days after spray whereas, in lower dose mortality was accumulated slowly. After two weeks there was still 15.29% difference in mortality due to 0.05 and 0.1% of Malathion.

The results show that Malathion 57EC has effective potential for controlling *P. obliquifasciella*. These results are in conformity with that of Chaudhry (1988). However, it is not possible to compare exact mortality results because of different insect pests/pesticide combinations. Likewise, dose – mortality outcome corroborates the results of Kasana *et al.*, (1995), i.e. larval mortality increases with the increase in Malathion concentration. Also pest mortality improved with the passage of time.

ii. Efficacy of antimoultants

Atabron caused comparatively higher mortality than Dimilin at 0.025 and 0.05% concentrations. Data on mean percent mortality of *P. obliquifasciella* caused by different dose rates of Dimilin and Atabron are presented in table 2.

Table 2: Mean mortality (%) of *P. obliquifasciella* on *C. fistula* at different post treatment intervals by different dose rates of two antimoultants

| Antimoultant | Doses | Post Treatment Intervals | | |
|---------------|--------|--------------------------|----------------------|----------------------|
| | | 1 st Week | 2 nd Week | 4 th Week |
| | | * | * | * |
| Dimilin 25 WP | 0.025% | 47.29 c | 73.55 b | 84.54 b |
| Dimilin 25 WP | 0.05% | 66.94 ab | 78.67 ab | 88.14 ab |
| Atabron 5EC | 0.025% | 58.16 b | 79.06 ab | 80.38 c |
| Atabron 5EC | 0.05% | 73.17 a | 82.46 a | 89.36 a |
| Check | - | 0 d | 0.0 c | 0.0 d |
| LSD | | 9.82 | 8.54 | 4.13 |

- Significant at 99% level of significance
- Figures in the same column having the same alphabets are non-significant (P 0.05) among themselves

Maximum 73.17, 82.46 and 89.36 percent mortality was recorded in Atabron @ 0.05% after one, two and four weeks, respectively against zero percent natural mortality in control (calculated after Henderson Tilton formula). After 1st week order of mortality was 66.94, 58.16, 47.29 and 0.0 percent in

Dimilin @0.05%, Atabron @ 0.025%, Dimilin @ 0.025% and control, respectively. There was statistically non-significant difference in mortality caused by 0.05% Atabron and 0.05% Dimilin. Similarly, difference in mortality incurred by 0.05% Dimilin and 0.025% Atabron was non-significant. After two weeks, the difference in mortality in Atabron @ 0.05 & 0.025% and Dimilin @ 0.05% was statistically non-significant. Likewise, Atabron at 0.025% and Dimilin at 0.025&0.05% were non-significant among themselves. Between 1st and 2nd week 55.53 and 35.94% increase in mortality was observed in 0.025% Dimilin and 0.025% Atabron, respectively. Contrarily, increment in mortality was marginal (less than that of half recorded in 0.025%) in 0.05% Atabron and Dimilin. After four weeks mortality in 0.05% Atabron (89.36%) was statistically non-significant with that of 0.05% Dimilin (88.14%). Between 2nd to 4th week highest increment in mortality (14.94%) was recorded in Dimilin @ 0.025% followed by Dimilin @ 0.05% (12.04%), Atabron @ 0.05% (8.37%) and Atabron @ 0.025% (1.67%).

Results indicate that Malathion 57EC, Dimilin 25WP and Atabron 5EC give significant control of *P. obliquifasciella* in all their test doses. Malathion at 0.1 and 0.2% concentration are almost same in their effectiveness. The recommended dose rate of Malathion, i.e. 0.05% is significantly less effective than that of 0.1% concentration. The latter dose rate causes 15.29% more mortality that is significantly high. Therefore, Malathion 57EC at 0.1% concentration is recommended for controlling Amaltas leaf stitcher.

Between the two test antimoultants, Atabron is slightly better than Dimilin. Moreover, difference between the two doses of Dimilin, i.e. 0.025% and 0.05% is statistically non-significant. On the other hand, Atabron at 0.025% & 0.05% concentration has significant difference. Early high mortality caused by Atabron and Dimilin at 0.05% concentration is due to contact poisoning (pesticide property). While in lower dose increase in mortality is by virtue of insect growth regulating characteristic of these antimoultants. On the basis of these results Atabron and Dimilin at 0.05% concentration are suggested for effective and timely control of *P. obliquifasciella*.

Both the antimoultants at test doses give good control of *P. obliquifasciella* with 80.38 – 89.36% mortality. These results are comparable with that of previous workers like Chaudhry *et al.* (1984), Chaudhry & Gul (1985) and Rehman & Chaudhry (1987). Similarly, effectiveness period of 4 weeks is in corroboration with Chaudhry & Gul (1985). After one week mean mortality is low which increases with time. Mortality increases from 22.13 to 78.77% which shows the growth inhibitory effect of the test antimoultants. However, at higher doses in both the antimoultants insecticidal effect is evident from early high

mortality. Thus Dimilin and Atabron both act as antimoultants but also insecticides at higher doses.

Conclusion

Malathion, Dimilin and Atabron proved quite effective against *P. obliquifasciella*. Malathion @ 0.1% is recommended rather than 0.05% because former concentration gave significantly high mortality outcome. Similarly, to minimize damage of *C. fistula* from Amaltas leaf stitcher, Atabron and Dimilin are recommended at 0.05% concentration.

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