# CONTROL OF OAK DEFOLIATOR GAZALINA CHRYSOLOPHA KOLLAR

Wali-ur-Rahman, *Assistant Forest Entomologist and*
M.I. Chaudhry, *Director Entomology, Pakistan Forest Institute, Peshawar*

ABSTRACT

In laboratory trials against oak defoliator, *Gazalina chrysolopha* Koll. three antimoultant chemicals-Atabron, Alsystin and Dimilin in 0.04% concentration gave, respectively, 95, 90 and 85% larval mortality within 6 days while the insecticides Malathion and Sevin SP killed 100% and Orthene 80% larvae in the same dose within 24 hours. In lower doses of 0.01 and 0.02% antimoultants caused 60 to 75% and insecticides 70 to 80% larval mortality in the same periods.

The pest was controlled by spraying Malathion 57% E.C. in 0.17% concentration on the resting caterpillars at the base of trees without harming the natural enemies of the pest.

INTRODUCTION

*Gazalina chrysolopha* Koll. (Thaumetopoeidae: Lepidoptera) was recorded as serious pest of oak forest, *Quercus dilatata* in 1989 in Kahuta Range, Azad State of Jammu and Kashmir. The insect seems to be native and regional pest of oak forests as Stebbing (1914) reported it from eastern Himalaya on *Quercus lamellata* and Seitz (1913) from Kashmir and north west Himalaya to Sikkum.

Laboratory trials of antimoultant chemicals and insecticides were imperative for evolving effective and economical control measures. Antimoultant chemicals with specific properties are used against the agricultural and forest pests without harming the non target and beneficial organisms. Insecticides, controlling the pests instantly, cause environmental pollution and natural imbalance, particularly in the natural forests.

Rahman and Chaudhry (1987) tested Alsystin and Dimilin against hairy caterpillars, *Euproctis lunata* Walk. in 0.01, 0.02 and 0.04% concentrations and got 100% larval mortality within 20 days. Dimilin used by Abai (1981) against *Leucoma wiltshirei* Coll. on oak forests in Iran and Horstmann (1982) against *Tortrix viridana* L. and *Zeiraphera isertana* F. on oak forests in German Federal Republic caused 100% larval mortality.

METHOD AND MATERIALS

Trials were conducted in a field laboratory set up at Kahuta near the insect outbreak area. Larvae were collected from the forest and reared in cages in the laboratory at room temperature ranging from 15 to 25°C. Three antimoultant chemicals, Atabron, Alsystin and Dimilin and three of the safer insecticides, Malathion, Sevin and Orthene were sprayed in 0.01. 0.02 and 0.04% concentrations in two replications in CR design.

To test antimoultant chemicals 9 cm shoots of oak were sprayed evenly with 35 ml of the concentration of each dose with an air compressed hand atomizer. The shoots were dried and placed in glass chimneys. 20 larvae of equal size were released on shoots in

each treatment and covered with muslin cloth.

To determine the direct contact toxicity of the insecticides each batch of 20 larvae was placed on 30x30 cm cardboard laid on the floor and sprayed with 35 ml of the concentration of each dose with the air compressed hand atomizer. After treatment the larvae were shifted to clean petri dishes covered with muslin cloth. Observations were recorded daily.

For control operation the forest department procured Malathion 57% EC and air compressed sprayers. The operation was launched under the supervision of the field forest staff. Each and every tree was visited by the sprayers in a sequence, larvae at the base of trees were exposed by removing the silken webs with sticks and sprayed directly. Stems of trees were also sprayed upto one meter from the ground level for contact poisoning of the escaping larvae.

## RESULTS AND DISCUSSION

Observations on the mortality of larvae in various treatments were compiled and are tabulated below:

Table 1. Efficacy of antimoultant chemicals against *Gazalina chrysolopha* Koll.

| Concentration | Mortality out of 20 larvae each | | Total | % |
|---|---|---|---|---|
| | $R_1$ | $R_2$ | | |
| | Atabron 5% EC | | | |
| 0.01 | 14 | 10 | 24 | 60 |
| 0.02 | 10 | 16 | 26 | 65 |
| 0.04 | 18 | 20 | 38 | 95 |
| 0.00 | 10 | 2 | 12 | 30 |
| | Alsystin 25% WP | | | |
| 0.01 | 16 | 14 | 30 | 75 |
| 0.02 | 12 | 18 | 30 | 75 |
| 0.04 | 20 | 16 | 36 | 90 |
| 0.00 | 10 | 6 | 16 | 40 |
| | Dimilin 25% WP | | | |
| 0.01 | 16 | 10 | 26 | 65 |
| 0.02 | 16 | 12 | 28 | 70 |
| 0.04 | 20 | 14 | 34 | 85 |
| 0.00 | 10 | 2 | 12 | 30 |

ANOVA

| SV | df. | SS | MS | F.ratio | Prob. F. |
|---|---|---|---|---|---|
| | | | Atabron | | |
| Dose | 3 | 170 | 56.67 | 3.78 | 0.1159 |
| Error | 4 | 60 | 15 | | |
| Total | 7 | 230 | | | |
| | | | Alsystin | | |
| Dose | 3 | 108 | 36 | 4.00 | 0.1069 |
| Error | 4 | 36 | 9 | | |
| Total | 7 | 144 | | | |
| | | | Dimilin | | |
| Dose | 3 | 130 | 43.33 | 2.28 | 0.2213 |
| Error | 4 | 76 | 19 | | |
| Total | 7 | 206 | | | |

INTERACTION

| SV | df. | SS | MS | F.ratio | Prob. F. |
|---|---|---|---|---|---|
| Rep | 1 | 42.67 | 42.67 | 3.63 | 0.0832 |
| Treat | 2 | 12.00 | 6.00 | 0.51 | 0.6139 |
| Dose | 3 | 397.33 | 132.44 | 11.26 | 0.0011** |
| Dose* | | | | | |
| Treat | 6 | 10.67 | 1.78 | 0.15 | 0.9848 |
| Error | 11 | 129.33 | 11.76 | | |
| Total | 23 | 592.00 | | | |

** highly significant

Mortality occurred within 6 days after treatment. Atabron, Alsystin and Dimilin in the highest dose of 0.04% caused, 95, 90 and 85% larval mortality, respectively, as against 30-40% natural mortality in the check. In 0.01 and 0.02% doses larval mortality caused by Alsystin was higher (75% each) than Atabron (60 and 65%) and Dimilin (65 and 70%).

In statistical analysis individual concentration of each treatment was found insignificant. However the interaction between treatments and concentrations showed pronounced significant differences as shown in the above table, hence their combined effect cannot be neglected in controlling *Gazalina chrysolopha* Koll.

Table 2. Efficacy of insecticides against *G.chrysolopha* Koll.

| Concentration | Mortality out of 20 larvae each $R_1$ | $R_2$ | Total | % |
|---|---|---|---|---|
| | Malathion 57% EC | | | |
| 0.01 | 16 | 16 | 32 | 80 |
| 0.02 | 15 | 17 | 32 | 80 |
| 0.04 | 20 | 20 | 40 | 100 |
| 0.00 | 0 | 0 | 0 | 0 |
| | Sevin 85% SP | | | |
| 0.01 | 16 | 12 | 28 | 70 |
| 0.02 | 16 | 20 | 36 | 90 |
| 0.04 | 20 | 20 | 40 | 100 |
| 0.00 | 0 | 0 | 0 | 0 |
| | Orthene 85% EC | | | |
| 0.01 | 13 | 19 | 32 | 80 |
| 0.02 | 18 | 14 | 32 | 80 |
| 0.04 | 15 | 17 | 32 | 80 |
| 0.00 | 0 | 0 | 0 | 0 |

ANOVA

| SV | df. | SS | MS | F.ratio | Prob. F. |
|---|---|---|---|---|---|
| | | | Malathion | | |
| Dose | 3 | 472 | 157.0 | 31.40 | 0.001** |
| Error | 4 | 20 | 5.0 | | |
| Total | 7 | 492 | | | |
| | | | Sevin | | |
| Dose | 3 | 488 | 162.0 | 25.03 | 0.0047* |
| Error | 4 | 26 | 6.5 | | |
| Total | 7 | 514 | | | |
| | | | Orthene | | |
| Dose | 3 | 384 | 128.0 | 25.6 | 0.0045* |
| Error | 4 | 20 | 5.0 | | |
| Total | 7 | 404 | | | |

** = Highly significant
* = Significant

Within 24 hours of treatment Malathion and Sevin brought about 100% and Orthene 80% larval mortality. In 0.04% dose while in 0.02% dose Malathion and Orthene each caused 80% and Sevin 90% larval mortality. In 0.01% dose Malathion, Sevin and Orthene gave respectively 80, 70 and 80% larval mortality. No mortality occurred in check no treatment.

The statistical analysis revealed highly significant results of Malathion at 1% level and significant results of Sevin and Orthene at 5% level.

Malathion, being the safest insecticide for wildlife with 1375 mg/kg acute oral LD- 50 and found the most effective in 0.04% dose, was selected for control operation against the pest. Due to 3-4 showers of rain a day the dose was enhanced to 0.17% which killed larvae with in 6 hours. The operation was launched during October - November, 1989 and April to July, 1990 covering 94,530 trees in a total area of 4,110 acres. In 1785 acres the operation was repeated. A total of 709 litres of insecticide costing Rs. 0.12 million was applied in 5895 acres of the forest. A total cost of Rs. 0.472 million was incurred on the control operation. In the post-operation observations, carried out during October, 1990 and May 1991, 80 to 90% trees were found free from the pest population. On 10-20% trees minor population of 10 to 110 larvae per tree was recorded as against 500 to 5000 larvae per tree before the control operation. The natural fauna was not affected as an egg parasite and a larval predator were found working on the remaining population.

Use of antimoultant was not feasible because these chemicals act when fed upon for 2-3 days for which the entire tree foliage were to be sprayed and the operation would cost many fold besides being slower process.

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