

EFFICACY OF ANTIMOULTANTS AGAINST POPLAR DEFOLIATOR
ICHTHYURA ANASTOMOSIS STEPH AND SHISHAM DEFOLIATOR
PLECOPTERA REFLEXA GUEN

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and

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Abstract

Antimoultant insecticides, Alsystin and Dimilin 25% W.P. which inhibit chitin synthesis in insects were tried against 2nd and 3rd instar larvae of shisham defoliator, *Plecoptera reflexa* Guen. (Notodontidae). Both the chemicals in laboratory as well as field trials, in doses of 0.02 and 0.04% concentrations gave cent percent mortality of the larvae. The residual effect of the insecticides continued upto about one month and provided cover for two successive and overlapping generations. The non-target insects, which do not feed on foliage were absolutely safe from the adverse effect of the chemicals.

Introduction

Shisham defoliator, *Plecoptera reflexa* Guen. and poplar defoliator, *Ichthyura anastomosis* Steph. are very serious pests, occasionally appearing in epidemic form, effecting at least 60% of the annual growth of the trees. In spite of good complex of natural enemies working actively on both the pests in most forest plantations outbreak of the pest populations is a common occurrence every 4 – 5 years (Chaudhry *et al.* 1966). Large scale leaf loss affects tree growth, ultimately resulting in serious reduction in wood yield (Chaudhry 1965). To protect these fast growing trees from these serious insects pests Chaudhry and Ahmad (1973) recommended spraying of 0.1% Lebaycid while Shah *et al.* (1978) found Decis, Tamaron and Sevin effective for complete mortality of larvae in 0.01% concentration. Shah *et al.* (1979) have recommended the bacterial insecticides Dipel and Bactospeine in 0.1% concentration against poplar defoliator while these products proved ineffective against shisham defoliator.

Due to environmental pollution by spraying of chemical toxicants and resultant imbalance of biotic complex the pest managers have to resort to the use of safer methods and non poisonous chemicals.

Review of Literature

The antimoultants are chemicals which interfere with the formation of Chitin in the insect cuticle and prevent moulting ultimately causing death (Mulder and Gijswijt, 1973) but

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direct effect on adults is rare and generally not lethal (Maas *et al.* 1980). Dimilin and Alsystin have been successfully used against many forest pests. The effects of Dimilin on the non-target insects have been studied extensively which are summarized below:

Predatory mite, *Amblysoius potentillae* remained unaffected after feeding on European red mites, *Panonychus ulmi* exposed to Dimilin (diflubenzuron) spray on apple leaves at a concentration of 500 mg a.i. per litre for more than a week (Van devrie, unpublished data as reported by Mass *et al.* 1980). The results were also confirmed by Hassan (1983) on adult of *A. potentellae* exposed to spray with 125 mg a.i. per litre of Dimilin.

Diflubenzuran proved nontoxic to nymphs and adults of *Stethorus punctillum*, coccinellid predator on *Tetranychus utricae* treated at the rate of 12.5 and 25 mg a.i. per 100 litres (Lyon and Lyon, 1975).

At a high dose of 50 g a.i. per 100 litres of Dimilin, the number of predatory nymphs (not bugs) of *Blepharidopterus angulatus* was reduced (Cranham, 1975) while at lower dose of 10 to 30 g a.i. per 100 litres bugs and nymphs both were safe (Ravensburg, 1981). Lace wings, *Chrysopa perla* feeding on aphids treated with 12.5 g and 25 g a.i. of Dimilin per 100 litres remained unaffected.

Survival of adult *Apanteles marginiventres* parasitic on cotton pests remained unchanged after a topical application of 1% a.i. diflubenzuron. At 0.02% a.i. neither fertility nor fecundity of adults was affected (Wilkinson *et al.* 1978). Similarly Hassan (1983) found no change in parasitization capacity of *Coccygominus turionellae*, *Phygadeuon trichops*, *Encursia formosa* and the egg parasites of *Leptomastix dactylopii*. Topical application of 1% a.i. diflubenzuron on *Voria ruralis* caused no significant mortality of its tachinid parasitoids (Wilkinson *et al.* 1978) where as parasitization behaviour of *Pales pavidus* was normal after being exposed to residues of 0.0125% a.i. diflubenzuron (Hassan 1983). Extensive and detailed investigations on the effect of Dimilin on different stadia stages of internal hymenopterous parasites have been carried out.

Granett and Dunbar (1975) reported that 4.7 to 150 g a.i. of Dimilin per 100 litres caused severe mortality of *Lymantria dispar* but population of the parasite, *Apanteles melanoscelus* (Braconidae) remained the same in treated and untreated plots. Skatulla (1975 b) and Hartinger (1976) described that 5th instar of *Yponomeuta evonymallus* failed to develop when fed on trees treated with 0.03% a.i. diflubenzuron but the parasites were not affected.

Skatulla (1975 a, b) conducted experiments by using diflubenzuron for the control of *Lymantria dispar* (at 75 g a.i./ha) and *L. monacha* (at 7.5 g a.i.) in oaks. No reduction of Various unspecified non-targets of the tree tops could be observed over a 8 weeks period.

Keeping in view the importance of the antimoultants trials were conducted against poplar and shisham defoliators in the laboratory as well as in the field.

Materials and Methods

Dimilin 25% W.P. and Alsystin 25% W.P. were supplied by the Agro-chemical limited and Chemedyes Pakistan Limited, respectively. In the laboratory trials poplar shoots fixed in glass tubes containing water were sprayed with 0.01%, 0.02% and 0.04% concentrations of Dimilin and Alsystin and transferred to glass chimneys covered with muslin cloth. Ten Second instar larvae of *Ichthyura anastomosis* were released, in each glass chimney, after the sprayed leaf surface dried up. There were three replications. The untreated larval chimneys were kept in a separate laboratory with similar temperature and humidity conditions. Observations recorded are given in Table-I.

The field trial were conducted against shisham defoliator at Rashakai (Mardan) in May/June, 1983 where enough population of the pest was found in nature, Dimilin and Alsystin were sprayed in 0.01, 0.02 and 0.04% concentrations. There were three replications under randomised split plot design.

Population counts were made five, twelve and twenty three days after treatment. The mortality of pest was calculated on the basis of larval population present in check at the time of observation. Results are compiled in Table-II.

Results

The data collected on the trial of Dimilin and Alystin conducted in the laboratory are :

Table I

Efficacy of Dimilin and Alsystin against *Ichthyura anastomosis* in the laboratory

Antimoultant Insecticide	Dose %	Mortality out of 30 larvae after (hours)				Total Morta- lity	% Morta- lity
		1	2	3	4		
			Young larvae				
			(24)	(48)	(72)	(96)	
Dimilin 25% W. P.	0.04	9	9	4	7	29	96
	0.02	5	14	7	—	26	86
	0.01	2	5	3	—	10	33
	Check	0	3	4	—	7	23
Alsystin 25% W. P.	0.04	19	8	3	—	30	100
	0.02	14	13	3	—	30	100
	0.01	0	8	10	—	18	60
	Check	2	3	1	—	6	20

Antimoultant Insecticide	Dose %	Mortality out of 30 larvae after (hours)				Total Mortality	% Mortality
1	2	3	4	5	4	5	
Mature Larvae							
Dimilin 25% W. P.	0.04	2	12	7	4	25	83
	0.02	1	5	12	—	18	60
	0.01	3	6	4	—	13	43
	Check	0	1	3	—	4	13
Alsystin 25% W. P.	0.04	1	8	15	—	24	80
	0.02	2	9	12	—	23	76
	0.01	0	8	10	—	18	60
	Check	2	3	1	—	6	20

Against a natural mortality of 13 to 23% larvae in check Alsystin in 0.04% dose caused a 100% mortality of young larvae and 80% mortality of mature larvae within four days of treatment. Likewise Dimilin gave 96% and 83% mortality of young and mature larvae, respectively in the similar concentration and during the same period.

Table II

Efficacy of Dimilin and Alsystin against shisham defoliator
Plecoptera reflexa in the field at Rashakai (Mardan N.W.F.P.)

Antimoultant Insecticide	Concentration %	Population of larvae			
		Before treatment	5 days after treatment	12 days after treatment	23 days after treatment
Alsystin 25% W. P.	0.04	On average 32 larvae per tree.	0	0	0
	0.02		0	0	0
	0.01		0	4	3
	Check		0	10	22
Dimilin 25% W. P.	0.04		0	0	0
	0.02		0	0	0
	0.01		0	5	3
	Check		0	12	40

In both the antimoultant insecticides in the 0.02 and 0.04% doses no larva was found but in 0.01% dose and check (no treatment) there were 3 to 5 and 10 to 40 larvae per tree, respectively. Trees treated with 0.04 and 0.02% concentrations of antimoultant insecticides were found free from defoliator larvae but the ants, mantids, spiders and beetle and other non-target arthropods were found.

Acknowledgement

The authors are grateful to M/S Agro-chemical Pakistan Ltd. and Chemdyse Pakistan Ltd. for providing samples of Dimilin and Alsystin for conducting these trials. Authors are also thankful to M/S Masood Alam of Chemdyse Pakistan Ltd. and M. Ayub Khan, Technical Assistant of Pakistan Forest Institute for the help in laying out these trials in the laboratory and field.

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