LABORATORY TRIAL OF DIPEL AGAINST POPLAR DEFOLIATOR- *ICHTHYURA ANASTOMOSIS* STEPH. (NOTODONTIDAE: LEPIDOPTERA)

by

M. Ismail Chaudhry and Bashir Hussain Shah*

Abstract. *Trials of Dipel, a preparation of Bacillus thuringiensis and chitinase, were conducted against larvae of poplar defoliator, Ichthyura anastomosis Steph. in the laboratory. In the first trial there was* 100% *mortality of larvae within three days of release on poplar shoots treated with* 1% *and* 1.5% *concentrations of Dipel and within two days in case of* 2% *concentration of Dipel. In check there was only* 36% *natural mortality of larvae.*

In the second trial there was 100% *mortality of larvae within* 6 *days of release on poplar leaves treated with* 0.1% *concentration of Dipel and within four days of release on poplar leaves treated with* 0.5% *and* 1% *concentrations of Dipel while in check there was only* 30% *mortality of larvae in the laboratory condition.*

Introduction. Poplar is an important fast growing tree species being introduced in Pakistan to meet the requirement of industries producing paper pulp, matches and packing cases etc. Unfortunately poplars are subject to the attack of many insect pests, among them *Ichthyura anastomosis* is a very serious defoliator in Pakistan. It was first recorded by Chaudhry (1966) on poplar at Abbottabad and was reported as serious defoliator of Poplar in Pakistan in 1969 (Chaudhry et al). Biology, ecology and population dynamics of the pest has been studied by Chaudhry and Ahmad (1973). Chaudhry and Ahmad (1973) controlled an epidemic of the pest by spraying 0.1% Lebaycid but insecticidal control poses serious environmental hazards. *Bacillus thuringiensis* a disease causing bacteria extracted from various lepidopterous pests has been developed into a commercial microbial insecticide. Many workers e.g. Smirnoff (1963), Sider, (1971), Mihalache, (1972), Podgwaite (1972), Jaque (1972), Yendol et al (1973) and Arru (1975) tried *Bacillus thuringiensis* in the form of Thuricide, Entobacterin, Dendrobacillus and Dipel against different forest defoliators with good success. Bacillus diffuses in the larval body and causes septicemia of haemolymph of the larvae. The fore and hind intestines of insects being lined with chitin, the difusion of Bacillus through these parts is retarded, hence application of Bacillus along does not control the pest completely. The efficacy of Bacillus can be increased by addition of an enzyme chitinase which hydrolyses the chitinous layer of intestines and facilitates the release of Bacillus into haemolymph.

Smirnoff et al (1972) tried *Bacillus thuringiensis* and chitinase against spruce budworm on small scale in 1972 and as aerial spray on large scale in 1974 with considerable success. Mihalache (1972) found Dipel very effective against *Lymantria dispar. Malacosoma anectria* and *Tertrix viridama.* No work on microbial control of Lepidopterous pests has

* The authers are Forest Entomologist and the Systematic Entomologist at the Pakistan Forest Institute Peshawar.

been done in Pakistan. This study was undertaken with a view to find out effective and environmentally safe control measures for the poplar defoliator.

Material and Methods. Sample of Dipel was provided by Dr. Ole Zethner of Denmark on our request for the trial against different defoliators. Dipel is a commercial formulation based on H.D.I. strain of *B. thuringiensis* vra. alesti (Arru 1975). Trial of Dipel on poplar defoliator larvae reared in laboratory was conducted during 1975 in the laboratory. Poplar shoots fixed in glass tubes containing water were sprayed with 1%, 1.5% and 2% concentrations of Dipel and transferred to glass chimneys covered with muslin cloth after the leaf surface became dry. Ten, third instar larvae of *Ichthyura anastomosis* were released in each glass chimney. There were 6 replications and a check for each concentration kept in separate laboratory under the same temperature and humidity to avoid infection to the untreated larvae. Observations were taken daily and fresh food was supplied to living larvae.

In a second trial conducted in September, 1975, lower concentrations of 0.1%, 0.5% and 1% Dipel were tested against the pest. The method of treatment and observations was the same.

Results and Discussions. The mortality of larvae after different periods out of the 60 larvae treated with each concentration is given below:

	Concentration %	Larval mortality after: (days)								% mortality
		1	2	3	4	5	6	8	10	
Experiment 1	0	11	5	3	1	0	2	—	—	36.6[a]
	1.0	38	12	10	—	—	—	—	—	100
	1.5	45	8	7	—	—	—	—	—	100
	2.0	52	8	—	—	—	—	—	—	100
Experiment 2	0	10	—	—	3	—	2	2	1	30
	0.1	32	—	—	26	—	2	—	—	100
	0.5	44	—	—	16	—	—	—	—	100
	1.0	53	—	—	7	—	—	—	—	100

a. 63.4% of the larvae pupated and 51.6% moths emerged.
b. 70% larvae pupated and 63% moths emerged.

It may be seen from the data that there was 100% mortality of larvae in all concentraton of Dipel treated in both the experiments. Thus even with 0.1% concentration, 97% of the larvae were killed four days after treatment while all the higher concentrations gave 100% mortality within four days of treatment. In the check in first and second experiment there was 36.6% and 30% natural mortality of larvae respectively.

From these results it is evident that Dipel is quite effective for the control of this serious defoliator and can replace the chemical insecticides being used against this pest. Field trials are, however, necessary for confirmation of laboratory tests. After confirmation of results in the field Dipel can be recommended against the pest. No doubt Dipel is costlier insecticide in market at present but can be manufactured in Pakistan at a very low cost. The main cost of its production is charges of labour engaged for large scale rearing of larvae, infecting them with Bacillus and extraction of Bacillus from the dead larvae with the help of centrifuge machines. Labour is much cheaper in Pakistan than most of the european countries where these insecticides are presently manufactured. If manufacture of microbial insecticides is started in Pakistan, Dipel as well as other microbial insecticides can be produced at a very low cost. A huge amount of foreign exchange being spent on the import of chemical insecticides can be saved and poisonous effect of these chemical on the environment can also be avoided.

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