EFFICACY OF *BACILLUS tHURINGIENSIS* BERLINER AGAINST *PIESMOPODA oBLIQUIFASCIELLA* (HAMPS), PYRALIDAE, LEPIDOPTERA, A LEAF STITCHER OF *CASSIA fISTULA*

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ABSTRACTS

Bactospeine, a commercial peparation of *Bacillus thuringiensis* was tried against *Peismopoda obliquifasciella* (Hamps), a serious leaf stitcher of Amaltas, *Cassia fistula.* The microbial insecticide gave 84.4, 78.1 and 90.7% mortality of the test larvae with dose of 0.8×10^5, 1.6×10^5 and 3.2×10^5 spores per ml against a natural mortality of 34.4% larvae in the check. The efficacy of the product has been proved against this insect hence it can be used on field scale to control the pest.

INTRODUCTION

Amaltas, *Cassia fistula* is an ornamental fast growing avenue tree, producing very valuable and durable timber of multifarious uses in agriculture, house-hold and boat building. The tree is also famous for its medicinal value as its various parts are commonly used in the cure of many human ailments.

Piesmopoda obliquifasciella (Hamps), Pyralidae, Lepidoptera, is a very serious leaf stitcher of *Cassia fistula* which causes large scale destruction of tree foliage by stitching leaves together and skeletonizing by feeding from within the stitched leaves. Generally more than 50% foliage are destroyed every year. Besides causing serious growth losses the leaf stitcher infestation destroys the natural colour of the foliage thereby ruining the whole complexion of the avenue for which the tree is mainly grown. To protect the tree from severe losses, working out effective method of controlling the leaf stitcher was considered essential. The use of toxicants in insect control being hazardous for useful fauna and the environment, biological method of control was tried. Among the natural enemies of insect pests microbes particularly the bacteria has acquired a definite place during the recent years. Based on advanced researches some commercial products have been produced and marketed which include *Bacillus thuringiensis* as an effective control agent against many insects.

Berliner (1915) isolated the bacterium from the diseased larvae of the Mediterranean flour moth *(Ephestia kuhniella)* and named it *Bacillus thuringiensis.*

Husz (1927) found it effective against European Corn borer, *Pyrausta nubilalis.* Krieg (1961) recorded susceptibility of larvae of 100 lepidopterous species to this bacterium. Heimpel and Angus (1963) stated that susceptibility of insects belonging to Hymenoptera Coleoptera, Diptera and Orthoptera to the bacterium varied greatly.

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Arthur and Angus (1965) obtained 80% mortality of field population of *Thymeticus lineola* (Ochs) by using a commercial preparation of *Bacillus thuringiensis* containing 3 x 10^{10} spores per gram applied at the rate of 1.5 to 2.0 pints per acre. The larval feeding stopped 48 hours after treatment. The 3rd and 4th instar larvae were found more susceptible.

Angus (1968) stated that forest tent caterpillar, *Melacosoma disstria* Hubn was susceptible to the bacterium, where the disease produced a coupled toxemia – septicemia. Jaques (1971) reported that *Haliothis zea* was susceptible to the toxins of *Bacillus thuringiensis*. He recommended further tests by using better methods of field application.

Reeks and Cameron (1971) reported that this bacterium is the most frequently used pathogens against forest insects. Harper (1971) reviewed the efficacy of *Bacillus thuringiensis* against forest insects such as gypsy moth, spring and fall cankerworm and tent Caterpillar. He classified the test insects into:

1. Readily suppressed which included tent caterpillars, spawnworms, bagworms and cankerworms.

2. Susceptible but not readily killed, which include gypsymoth and spruce budworms.

Shah et al (1979) obtained complete kill of *Ichthyura anastomosis* Steph. by using a commercial preparations of *B. thuringiensis* in 0.1% dose.

Rehman and Chaudhry (1980) obtained 100% mortality of wax moth larvae, *Galleria melonella*(L.) by using *B. thuringiensis* commercial preparation in the laboratory.

MATERIAL AND METHOD

Bactospiene, the microbial insecticide based on the bacterium, *Bacillus thuringiensis* was provided by M/S Agro Chemicals Limited, Karachi, as a free sample for trial. The larvae of the leaf stitcher, *Piesmopoda obliquifasciella* (Hmps) were collected for the trial from the avenue trees planted in the Pakistan Forest Institute, Peshawar and reared in the sterilized glass petri dishes upto 4th instar. Three dilutions of the microbial insecticide were prepared in water as follows:

D_1	3.2×10^5 spores per ml.
D_2	1.6×10^5 spores per ml.
D_3	0.8×10^5 spores per ml.

Five ml of each dilution was sprayed on the water washed and dried fresh leaves of *Cassia fistula* and placed in sterilized glass petri dishes. Eight larvae of the leaf stitcher were released in each petri dish containing treated leaves. Eight larvae were also released on untreated leaves of the host in each petri dish for check. The experiment was replicated four times under randomized complete block design. Untreated fresh leaves were provided in all subsequent food changes which took place every 2 to 5 days.

Sterilized apparatus was used all through the experiment to avoid any natural contamination. Infectivity and mortality of larvae was observed in each dish at every time of the food change.

RESULTS AND DISCUSSION

The bacterium, *Bacillus thuringiensis* entered the alimentary tract of the leaf stitcher alongwith the food and the presence of chitinase in the microbial insecticide facilitated the bacteria to defuse into the body cavity and cause septicemia of haemolymph in the test insects. The mortality caused by the disease causing bacteria was recorded in each dish and are tabulated below:

Mortality of *Piesmopoda obliquifasciella* larvae caused by Bactospiene (*Bacillus thuringiensis*)

	Mortality after (days)							
Dose	4	7	9	10	13	19	Total	%
D_0	0	0	6	0	2	3	11	34.4
D_1	11	9	5	1	1	0	27	84.4
D_2	18	7	0	0	0	0	25	78.1
D_3	18	5	4	1	1	0	29	90.7

The mortality of 78.1 to 90.7% larvae of leaf stitcher in the bacterial treatments is significantly more than 34.4% in the check no treatment. For the significance tests the data was compiled replication-wise as follows:

Replication-wise mortality of *P. obliquifasciella* larvae caused by Bactospeine

Dose	R1		R2		R3		R4		Total		Mean
	No.	%	No.	%	No	%	No.	%	No.	%	
D_0	4	12.5	2	6.2	1	3.1	4	12.5	11	34.4	8.6
D_1	6	18.8	7	21.9	8	25.0	6	18.8	27	84.4	21.1
D_2	5	15.6	8	25.0	6	18.8	6	18.8	25	78.1	19.5
D_3	7	21.9	7	21.9	8	25.0	7	21.9	29	90.7	22.7

The statistical analysis showed that Bactospiene treatments are highly significant from D_0 but mutually the doses D_1, D_2, and D_3 are non-significant.

It has been proved in this experiment that 0.8×10^5 spores per ml gave as much mortality of the test insect as four times its dose of 3.2×10^5 spores per ml which indicated that number of bacteria did not matter much in this case. The microbial insecticide based on *Bacillus thuringiensis* proved its efficacy and can be used in the field for controlling the serious pest of Amaltas, *Cassia fistula* without any danger of environmental pollution.

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