

# COMPARATIVE EFFICACY OF FIVE INSECTICIDES AGAINST TOP SHOOT BORER OF *CALAMUS TENUIS* ROXB.

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## ABSTRACT

The efficacy of five systemic insecticides, namely, diazinon, dicrotophos, dimethoate, phosphamidon and oxydemeton-methyl, each at 0.1% a. i., was studied against the top shoot borer, *Ommatolopus haemorrhoidalis* (Wiedemann) (Curculionidae : Coleoptera) of cane (*Calamus tenuis* Roxb.). The insecticides were applied as foliar spray on 3-years old cane plantation at the Cane Arboretum of Bangladesh Forest Research Institute, Chittagong. Each insecticide reduced pest population significantly against the unsprayed control. Phosphamidon and oxydemeton-methyl worked better in reducing the pest attack followed by diazinon, dicrotophos and dimethoate. No visible phytotoxicity was recorded for any insecticide tested.

## সারসংক্ষেপ

বেতের ডগা ছিদ্রকারী পোকা দমনের জন্য পাঁচটি অন্তর্ভাহী কীটনাশক ঔষধ, যথা : ডায়াজিনন, ডাইক্রটোফস, ডাইমিথোয়েট, ফসফামিডন এবং অক্সিডিমিটন-মিথাইল-এর কার্যকারিতা পরীক্ষা করা হয়। চট্টগ্রামস্থ বাংলাদেশ বন গবেষণা ইনস্টিটিউটের তিন বছর বয়স্ক আক্রান্ত বেত বাগানে কীটনাশকগুলো ০.১% এ, আই, হারে প্রয়োগ করা হয়। এই পোকা দমনে প্রতিটি কীটনাশকই কার্যকরী প্রমাণিত হয়। তবে ফসফামিডন ও অক্সিডিমিটন-মিথাইল সবচেয়ে বেশী ফলপ্রসূ। এর পরেই নিম্নক্রমানুসারে রয়েছে ডায়াজিনন, ডাইক্রটোফস এবং ডাইমিথোয়েট। গাছের উপর ঔষধের ক্ষতিকর কোন পার্শ্বপ্রতিক্রিয়া পরিলক্ষিত হয়নি।

## INTRODUCTION

Cane is one of the most important forest resources of Bangladesh. Due to overexploitation the natural stock of this resource is being depleted at an alarming rate and will be exhausted in near future if proper management techniques and extensive plantation programmes are not undertaken. During the last few years, serious infestation by a top shoot borer, *Ommatolopus haemorrhoidalis* (Wiedemann) (Curculionidae : Coleoptera) in plantations of *Calamus*

*tenuis* Roxb., previously wrongly identified as *C. guruba* Buch.-Ham., at the Cane Arboretum of Bangladesh Forest Research Institute, Chittagong was reported (Baksha 1987). In such a situation, there is hardly any alternative but to resort to chemical control by applying insecticides. A number of insecticides are available in the market. The recommendations by the manufacturers are based on tests on agricultural pests and, therefore,

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information on the effectiveness of pesticides for the control of forest pests is not readily available. This results in considerable difficulty in selecting insecticides for forest pest control. Realizing the severity of damage by the pest it was considered necessary to evaluate the efficacy of some locally available insecticides for effective control of the pest.

## MATERIALS AND METHODS

The study was conducted in a 3-years old plantation of *C. tenuis*, locally known as jali bet, in the Cane Arboretum of Bangladesh Forest Research Institute, Chittagong. The experiment was laid out in a completely randomised design with five replications. Each treatment consisted of five clumps selected at random. Five systemic insecticides viz., diazinon, dicotophos, dimethoate, phosphamidon and oxydemeton-methyl, each at 0.1% concentration, were evaluated and compared with an unsprayed control. Details of the insecticides are presented in Table 1.

formulations by diluting them with tap water using the formula :

$$D = \frac{I \times A}{T}$$

Where, D = Desired % of concentration

I = Amount of insecticide to be mixed with water

A = % of active ingredient present in the formulation

T = Amount of total mixture to be prepared

The insecticides were applied with the help of a manually operated knapsack sprayer. The sprayer was cleaned thoroughly before another insecticide was used. Pre-spray populations of the borer were recorded and found to be homogeneous in distribution. Three sprays, each at an interval of one month, were applied, and the data were recorded 72 hours after each spray. All the shoots, healthy and infested, in each clump were counted separately and therefrom the percentage of shoot infestation calculated. The percentage data so obtained were

Table 1. Details of insecticides tested against cane top shoot borer, *O. haemorrhoidalis*

Sl. No.	Common name	Trade name with formulation	Manufacturer
1.	Diazinon	Diazinon 60 E	Ciba-Geigy
2.	Dicotophos	Bidrin 85 EC	Shell
3.	Dimethoate	Perfekthion 40 EC	BASF
4.	Phosphamidon	Dimecron 100 EC	Ciba-Geigy
5.	Oxydemeton-methyl	Metasystox-R-25%	Bayer

The insecticides tested were of commercial grade and procured from local market. The desired concentrations were prepared on the basis of active ingredients present in the insecticidal

subjected to statistical analysis using angular transformation i. e. arc sine  $\sqrt{\%}$  transformation. The means were separated by Duncan's New Multiple Range Test (Little and Hills 1972).

## RESULTS AND DISCUSSIONS

The analysis of variance (Table 2) revealed that the variations in the percentage of shoot infestation for the treatments after each spray were highly significant ( $P < 0.01$ ).

oxydemeton-methyl (11.81%) proved more effective in reducing the shoot infestation followed by diazinon (19.47%), dicotophos (25.09%) and dimethoate (29.96%) in that order (Table 3).

Many workers conducted insecticidal

Table 2. Analysis of variance of transformed data of percentage of shoot infestation by cane top shoot borer, *O. haemorrhoidalis*

Sources of variation	df	MS				Observed F			
		1st spray	2nd spray	3rd spray	pooled	1st spray	2nd spray	3rd spray	pooled
Treatment	5	417.88	945.14	1048.12	1063.73	5.04*	13.36*	15.09*	75.98*
Error	24	82.93	70.75	69.44	14.00				

\* Significant at 1% level

Out of five insecticides tested, phosphamidon gave the least percentage of shoot infestation (20.80%) for the first spray but there was no significant difference between this result and those of diazinon (23.90%), dicotophos (24.71%), oxydemeton-methyl (27.79%) and dimethoate (37.24%).

After the second spray, phosphamidon gave further pest reduction in terms of shoot infestation (7.22%) but this did not differ significantly from oxydemeton-methyl (5.82%) and diazinon (14.54%).

Oxydemeton-methyl resulted in least shoot infestation (1.82%) after the third spray but it was statistically similar to phosphamidon (2.00%) at the probability less than 1% level.

Analysis of the pooled percentage of shoot infestation (i. e. total percentage of shoot infestation over the test period) revealed that each insecticide was effective significantly ( $P < 0.01$ ) in controlling the pest compared to the control. Phosphamidon (10.00%) and

trial against various forest insect pests (Sen-Sarma *et al.* 1982; Jones *et al.* 1980; Mann and Singh 1984; Singh and Gupta 1978a, 1978b). In a field trial of five insecticides against poplar defoliator, total control was obtained with sevin, thiodan or hostathion (Shah *et al.* 1978). The granular insecticides, temik, diazinon and thiodan could control the pest completely when mixed with the soil around the base of 2-years old borer infested poplars but spraying of stem with dimecron or carbicron proved ineffective (Gul and Chaudhry 1980).

Unlike the studies conducted by Shah *et al.* (1978) and Gul and Chaudhry (1980), the insecticides tested in the present study were found neither to control total borer population nor they proved prophylactic against the pest. However, each gave, on an average, significant reduction of the pest over the control during the test period. The reduction of shoot infestation was mainly due to death of insects inside the cane after each insecticidal spray. Most often, the infested shoot recovered and produced new shoots after the death

**Table 3. Efficacy of different insecticides at 0.1% concentrations against cane top shoot borer, *O. haemorrhoidalis***

Insecticide	Mean % of shoot infestation after			Pooled mean % of shoot infestation
	1st spray	2nd spray	3rd spray	
Diazinon	23.90 b (29.23)	14.54 bc (22.17)	19.97 a (26.50)	19.47 c (26.18)
Dicrotophos	24.71 b (26.95)	32.50 ab (34.51)	18.06 a (24.73)	25.09 bc (30.05)
Dimethoate	37.24 ab (36.92)	27.00 ab (30.84)	25.64 a (29.89)	29.96 b (33.13)
Phosphamidon	20.80 b (26.80)	7.22 c (12.17)	2.00 b (3.69)	10.00 d (18.35)
Oxydemeton-methyl	27.79 b (31.71)	5.82 c (8.82)	1.82 b (3.51)	11.81 d (20.08)
Control	59.67 a (50.74)	49.48 a (44.70)	40.07 a (38.88)	49.74 a (44.85)
LSD <sub>0.01</sub>	(16.10)	(14.89)	(14.74)	(4.17)
CV (%)	(26.00)	(32.99)	(39.31)	(13.00)
SE (±)	(2.16)	(2.72)	(2.82)	(2.55)

Notes : i) For each column, figures followed by same letter(s) do not differ significantly at 1% level.

ii) Figures in parentheses are based on arc sine  $\sqrt{\%}$  transformation.

of insect inside. No phytotoxicity was visible for any insecticide tested.

According to Gul and Chaudhry (1980) phosphamidon proved ineffective in controlling poplar stem borer when applied as spray on the stem. In the present study this insecticide, however, gave the best result in controlling the top shoot borer of cane when applied as a foliar spray.

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