

INSECTICIDAL PROPERTIES OF THE FUNGUS TRICHODERMA Sp.

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ABSTRACT

The insecticidal activity of the petroleum ether extract of the fungus, *Trichoderma* Sp. has been investigated against the mosquito, *Culex fatigans* Wied. and the house fly, *Musca nebulo* Linn. The extract has been found to be toxic to mosquitoes but not to the house flies.

INTRODUCTION

In recent years rapid increase of resistance in a number of insect species to synthetic insecticides and the discovery of the hazards involved to man and wild life resulting from the toxic residues left behind and the non-selective action of these insecticides have raised doubts about the long term value of chemical methods of insect control. Consequently there has been a revival of interest in procedures based on biological control and the use of pathogenic organisms like bacteria, virusis, fungi and antibiotics for the control of insects.

A number of fungi and bacteria have been known to attack and cause death to insects (Steinhaus 1949, and Heimpel and Angus 1960). WHO has recently given support to studies on *Coelomomyces*, a fungus that attacks mosquitoes (WHO 1962). Fungal extracts have also been reported to be insecticidal. Sheshagiri Rao (1953) has reported the extract of the fruit body of the fungus *Ganoderma lucidum* to be toxic to the rice weevil, *Sitophilus oryzae* when applied topically. Kishaba *et al* (1962) found the culture filtrates of the fungus, *Myrothecium voridum* when applied topically in acetone solutions, to be insecticidal to *Epilachna varivestis*. Similarly a number of antibiotic substances mainly derived from fungi have been reported as insecticidal. Steinhaus and Bell (1953) reported the effectiveness of several antibiotics to resistant flies *Musca nebulo* Linn. Liles and Frank (1953) found certain antibiotics effective against chlordane resistant cockroaches, *Periplaneta germanica*. The fungus *Trichoderma* is well known for its antifungal and antibiotic properties (Weindling and Fawcett, 1936, Weindling 1934 and Metcalf 1958). This fungus was readily available amongst the fungal cultures maintained in the laboratory. It was, therefore, considered of interest to investigate its potentialities as an insecticide.

The present paper describes the insecticidal property of the petroleum ether extract of the fungus *Trichoderma* sp. to mosquitoes and flies

METHOD

The fungus *Trichoderma* sp. (Kanpur culture no. 70) was cultured on potato-dextrose broth at $30 \pm 2^\circ\text{C}$. The fungal mat was separated by filtering and was dried at 50°C in an oven. When completely dry, it was weighed and powdered in a pestle and mortar. The powder was extracted with petroleum ether (B.P. $40-60^\circ\text{C}$) in a Soxhlet apparatus for 8 to 10 hrs. The solvent was evaporated under reduced pressure and the extract obtained. The material thus obtained was an odourless, viscous, pale yellow substance. The yield of the extract was about 12 per cent. For testing the extract was redissolved in acetone and suitable concentrations obtained.

40—60 hrs. old female mosquitoes *Culex fatigans* Wied. and 4-5 days old female house flies, *Musca nebulosa* Linn. used in the tests were drawn from the laboratory cultures. Measured quantities of the insecticidal solutions were applied topically to the dorsal thoracic region of individual insect by means of an 'Aglā' micrometer Syringe. The insects were lightly anaesthetized and then the insecticide was applied on them. Insects treated with acetone alone were kept as control. DDT (Tech.) in acetone solution was used as a reference insecticide. Other details of the experiment were the same as described by Wal *et al* (1962).

RESULTS AND DISCUSSION

From the results summarised in Table I, it will be seen that extract is toxic to mosquitoes and causes 95 per cent kill at a dosage of 50 μ g per insect. It, however, exhibits no toxicity to the house flies even at a dosage of 60 μ g per insect. Further the results indicate that the extract is inferior in toxicity than DDT both in the case of the house flies and the mosquitoes. Nevertheless it is interesting to note that the material shows a certain specificity in its action towards the mosquitoes. The mode of action of the material is also typical as it causes no twitches, tremors or convulsions like DDT rather it appears to act by paralysing the wing muscles which does not allow the insects to take off after the material has been applied and ultimately leads to its death.

TABLE I

TOXICITY OF THE FUNGUS *Trichoderma* SP. TO *Culex fatigans* WIED. AND *Musca Nebulo* LINN.

Test Insects	Insecticide	Dosage kg/insect	% ** mortality after 24 hrs.	
<i>Culex fatigans</i> Wied	Fungal extract	20	15	
		30	75	
		40	90	
		50	95	
	DDT (Tech.)	0.20	30	
		0.28	65	
		0.36	72	
		0.60	95	
	<i>Musca nebulosa</i> Linn.	Fungal extract	20	0
			30	0
40			0	
50			0	
60			0	
DDT (Tech.)		8	23	
		18	50	
		24	72	
		30	90	

**There was no mortality in the controls.

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