

ANTIFUNGAL ACTIVITY OF SOME ANGIOSPERM TAXA AGAINST *MYROTHECIUM RORIDUM* Tode ex Fr.

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ABSTRACT

Antifungal activity of five medicinal plants were evaluated in vitro against leaf spot of cotton caused by *Myrothecium roridum* Tode Ex Fr. Poisoned food technique was adopted to evaluate the antifungal efficiency of leaf extracts of five medicinal plants. Mycelial growth of the pathogen was recorded on 3rd, 5th & 7th day of incubation. Per cent growth inhibition was calculated and antifungal efficiency of five angiosperm taxa was confirmed. Significantly lower mycelial growth of pathogen was recorded in aqueous as well as acetone leaf extracts of *Catharanthus roseus*, *Lantana camera* and *Eucalyptus globulus* and was found superior over rest. However, in aqueous as well as acetone leaf extracts of *Azadirachta indica* and *Withania somnifera* pathogen shows comparatively more mycelial growth.

Keywords: Antifungal, cotton, medicinal plants, *Myrothecium roridum*.

Introduction

Myrothecium roridum Tode Ex Fr. is one of the most dreaded pathogen causing several diseases of field crops. The use of synthetic fungicides to control the diseases, causes several adverse effects and create various problems such as residue in food and food pathogen resistance, toxicity to non-target organisms, environmental pollution (Doutt & Smith, 1971) in different agricultural ecosystems and hence it has become necessary to use eco-friendly formulations which can fit into integrated pest management.

The presence of antifungal compounds has long been recognized as an important factor to disease resistance (Mahadevan, 1982; Kurucheve *et al.*, 1997). Such compounds being biodegradable and selective in their toxicity are considered valuable for controlling different plant diseases. The present study was undertaken to identify the locally available plants having antifungal properties on in laboratory conditions.

A number of angiosperm plants have been reported for the presence of antimicrobial activities by several workers (Choudhary *et al.*, 2000; Ranware *et al.*, 2010).

Materials and Methods

a) Isolation of pathogen:

Infected leaves of cotton were collected from various cotton fields of Amravati region. *Myrothecium roridum* was isolated from diseased leaves of cotton and maintained on PDA slants. PDA will be employed to maintain pure culture of isolated fungus. The isolate were identified from available literature. Pathogenicity test was confirmed in laboratory on potted cotton plants by Koch's postulate method.

b) Preparation of leaf extract:

Leaf extracts of five plant species were prepared (Karade & Sawant, 1999) for the evaluation of antifungal activity. Five plant species belonging to angiosperms were collected from local sides of surrounding region. The samples were brought to the laboratory, leaves were washed 2-3 times in running tap water. The green natural leaves were surface sterilized by 0.6 % sodium hypochloride. One ml of distilled water was used for each gm of fresh plant material for maceration. The leaf extract obtained was first filtered through double layered muslin cloth and then filtered through Whatman filter paper

no. 40. The filter extracts of five plants were used for bioassays.

Acetone leaf extracts were prepared by using acetone instead of distilled water. 10 per cent aqueous and acetone leaf extracts was used to assess the bioactivity of *Myrothecium roridum*.

c) Poisoned food technique:

The antifungal efficacy of leaf extracts were determined against fungal pathogen following the poisoned food technique (Nene and Thapliyal, 1979).

The PDA medium was distributed into 250 ml conical flask @ 100 ml and the flasks were autoclaved for 15 minutes. The required quantities of leaf extracts of each plant and fungicide mancozeb were added separately into the flask to get desired concentrations. 20 ml melted poisoned PDA medium was poured in each sterilized petri dish and allowed to solidify. All the petri dishes were inoculated by pathogen separately. Disc from 7 days old culture was cut with sterilized cork borer and transferred aseptically in the center of petri dishes. Four petri dishes as control, aqueous extract, acetone extract and Mancozeb were accommodated for test fungus to assess the antifungal efficacy of experimented five plants. The inoculated petri dishes were incubated at 27 ± 2 °C under aseptic conditions. The radial mycelial growth of colony in diameter were recorded at 3rd, 5th & 7th days after incubation. Mycelial diameter of each treatment was compared with control plates. The per cent inhibition of mycelial growth was calculated.

Results and Discussion

The antifungal potency of different plant extracts against *Myrothecium roridum* varied with time intervals (Table 1). The results revealed that all the plant extracts were inhibitory to the mycelial growth of *Myrothecium roridum*. Among the plant extracts evaluated against the pathogen *Myrothecium roridum*, maximum inhibition of mycelial growth was recorded in acetone leaf extracts as compared to aqueous leaf extracts

of each test plants. The acetone leaf extracts of *Catharanthus roseus*, *Eucalyptus globulus* and *Lantana camera* found to be highly effective at 3rd day of incubation showed 100 per cent growth inhibition. *Withania somnifera* (17.39%) and *Azadirachta indica* (13.04%) showed less antifungal efficacy. Acetone leaf extracts of all five tested plants exhibits maximum i.e. 100 per cent growth inhibition on 7th day of incubation.

Similarly antifungal activity of various plant species have been reported by several workers. The similar results about the fungitoxic properties were recorded by Bambode & Shukla (1973) in aqueous and alcoholic leaf extracts of *Lantana camera*, *Azadirachta indica* and noted that these plants possess fairly good fungicidal action. Narain and Satpathy (1977) studied the antifungal activity of *Catharanthus roseus*. Singh & Dwivedi (1987) observed the fungitoxic effect of oils of *Eucalyptus globulus* against the *Sclerotium rolfsii*. Srivastava & Lal (1997) tested fungicidal effects of leaf extracts of *Azadirachta indica*, *Lantana camera*, etc. Fungal growth inhibiting nature of *Lantana camera*, *Azadirachta indica* was reported by Mamata & Rai (2004).

The variation in inhibitory effect of various plant extracts may be attributed to be quantitative and qualitative differences in the antifungal principles.

In conclusion, our study demonstrated that many plant extracts, e.g. acetone leaf extracts of *Catharanthus roseus*, *Eucalyptus globulus* and *Lantana camera* can be used for the biocontrol of the *Myrothecium roridum* causing leaf spot disease to cotton. Thus, this method of control can contribute to minimizing the risks and hazards of toxic fungicides, especially on cotton like plants.

Therefore, present work highlights the use of solvent extracted leaves extracts of *Catharanthus roseus*, *Eucalyptus globulus* and *Lantana camera* containing a highly potential phytochemical which could be characterized and thus, find its way into the arsenal of lucrative antimicrobial drugs.

Table 1: Effect of different plant leaf extracts on radial mycelial growth of *Myrothecium roridum*.

Sr. No.	Plant Leaf extracts	Radial mycelial growth(mm)*		Growth inhibition (%)	
		3 DAI		3 DAI	
		10 % Aq.	10 % Ac.	10 % Aq.	10 % Ac.
1	<i>Azadirachta indica</i>	20.00	20.00	13.04	13.04
2	<i>Catharanthus roseus</i>	10.00	0.00	56.52	100.00
3	<i>Eucalyptus globulus</i>	13.00	0.00	43.47	100.00
4	<i>Lantana camera</i>	12.00	0.00	47.82	100.00
5	<i>Withania somnifera</i>	20.00	19.00	13.04	17.39
6	Mancozeb	0.00	-	100.00	-
7	Control	23.00	-	-	-

*Mean of three replicates

DAI - Days after incubation; Aq. - Aqueous leaf extract; Ac. - Acetone leaf extract.

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