SHORT COMMUNICATION

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Evaluation of selected plant extracts as antifungal agents against *Fusarium moniliforme* Sheldon

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ABSTRACT

The experiments were carried out to test the aqueous extracts of twenty plants for their antifungal activity against Fusarium moniliforme caused rice foot rot. Results showed a differential activity of the plant extracts against the mycelium growth. The combined leaf extracts of Lawsonia alba (L.) and Acacia arabicae (Willd.) in general showed a strong enhancement in activities over the individual leaf extracts of Lawsonia alba and Acacia arabicae against the mycelium growth. The seed extracts of Dedonia viscosa (L.) also showed strong inhibitory effect against the tested fungi. The leaf extracts of Ocimum sanctum, Lantana macrophylae, Ocimum basilicum and Jacranda mimosaefolia (D. Don) petal extracts of Mimosa hamata (Willd) showed appreciable good inhibitory effect against the tested fungi.

Key words: *Fusarium moniliforme, antifungal, plant-extracts, phytochemicals.*

The foot rot disease of rice caused by *Fusarium moniliforme* is widespread in many rice growing areas and has been reported to cause 3.7-70 per cent yield loss in different countries (Bagga and Kumar, 1999). Generally synthetic fungicides is used in the management of fungal pathogens in agriculture which result in environmental pollution. There is thus an urgent need to develop eco-friendly management methods for this important disease. The present study was undertaken to evaluate the efficacy of selected plant extracts for their antifungal activity against *F. moniliforme* causing foot rot disease of rice.

Plant materials were collected from various parts of Haryana and their neighboring states on the basis of their traditional values mostly based on medicinal properties. The collected plant materials were thoroughly washed with tap water as well as distilled water and kept in dark in between the filter papers at room temperature (25°C-27°C) till completely dry. Each plant sample was individually grounded into powder for preparation of the extract. The fungus of *F. moniliforme* strain, IARI 4824(F) used for the study was obtained from IARI, New Delhi. The cultures were maintained at 4°C on Yeast Glucose Agar medium with periodic sub-culturing.

The plant part extract (15% w/v) was prepared by brewing in hot water. 15g dry powder of each plant sample was weighed and put in a cheesecloth bag and suspended in 100 ml of boiling distilled water for 20 minutes. The extract was decanted off into the flask and final volume was raised to 100ml. The supernatant was used for assay. The antifungal activity of each plant part extract was determined by measuring the mycelia growth inhibition of tested fungi as described by Bragulat *et al* (1991). The disc of (0.65cm) in diameter test inoculum was cut out from the edge of a growing fungal colony on glucose agar medium using a sterilized cork borer and placed at the centre of the agar medium under sterilized conditions. The experiments were conducted in triplicates along with equal number of controls. The fungus was incubated at 27 ± 1ºC and their growth diameters were measured after five days.

The selected plants extracts were combined in the ratio 1:1. Assay for the antifungal activity of the combined extracts was carried out by the food poisoning method (Bragulat *et al*., 1991).

It was observed that out of various extracts tested, leaf extracts of *Lawsonia alba* showed

maximum inhibitory effect (83.95%) against the mycelium growth of *F. moniliforme* followed by leaf extracts of *Acacia arabicae* (Table 1). The seed extracts of *Dedonia viscosa* was also observed to show strong inhibitory effect against the mycelial growth of *F. moniliforme*. Five plants showed moderate inhibitory effect against the mycelium growth of test fungus i.e. leaf extracts of *Ocimum sanctum*, *Lantana macrophylae*, *Ocimum basilicum*, *Jacranda mimosaefolia*, petal extracts of *Mimosa hamata*, while six plants have shown insignificant inhibition of mycelium growth against the test fungus. Six plants samples, however, did not show any inhibitory activity. The mixtures of leaf extracts of *Lawsonia alba* + *Acacia arabicae* (88.64%) showed maximum inhibitory activity as compared to the individual extracts (Table 1). Considering the need for an alternative eco-friendly approach to control the phytopathogens, it is worthwhile to screen the antifungal effects of locally available flora.

The leaf extracts of *L. alba* shown high inhibitory effect against the pathogen.*F. moniliforme*, which might be due to the presence of some antimicrobial phytochemicals. The plant *Lawsonia alba*, leaf extracts of *A. arabicae* and seed extracts of *Dedonia viscosa* possess various medicinal properties (Abraham *et al,* 1986 and Ganeshan *et al,* 2004).

The mixture of leaf extracts of *L. alba* + *A. arabicae* showed synergistic effect over the individual leaf extracts of *L. alba* and *A. arabicae*. This enhancement in activity of the combined extracts may be due to greater concentration of the various groups of botano-chemicals than in case of individual extracts and greater diversity of the various groups of botano-chemicals. Therefore, the spray of the combined leaf extracts of *L. alba* and *A. arabicae* could be used for protecting paddy crops against pathogenic organisms *F. moniliforme*.

Since the extracts of *A. arabicae*, *Mimosa hamata*, *Jacranda mimosaefolia* including the combined leaf extracts of *L. alba* + *A. arabicae* used in this study have not been tested before as inhibitor of phytopathogenic fungi, they are the new addition to this field of study. The presence of various secondary metabolites such as alkaloids, quaternary alkaloids, coumarins, flavanoids, steroids/terpenoids, phenols etc. have been reported in the various plants extracts (Abraham *et al*., 1986) which may be responsible for the antifungal properties of the plants studied.

Table 1 Anti-fungal activities of plants-extracts against *Fusarium moniliforme* (Mean ± SD)

Plant species	Part Used	% Inhibition of Mycelium Growth
Acacia arabicae Willd.	Leaf	70.23 ± 0.38
Acacia catechu Willd.	Stem	23.08 ± 1.47
Anthocephalus cadamba (Mig.)	Stem	23.60 ± 1.75
Cassia nodusa (Ham.)	Seed	22.50 ± 1.77
Dedonia viscosa (L.)	Seed	52.36 ± 1.12
Jacranda mimosaefolia (D.Don.)	Seed	32.14 ± 1.82
Lagerstroemia flos-reginae (Retz.)	Seed	-
Lantana camera (L.)	Petal	28.92 ± 2.12
Lantana macrophylae (Mart.)	Leaf	34.16 ± 2.22
Lawsonia alba (L.)	Leaf	83.95 ± 1.24
Melia azadirachta (L.)	Seed	29.76 ± 2.82
Mimosa hamata (Willd.)	Petal	32.20 ± 1.34
Murraya koenigii (Kurz.)	Leaf	-
Musa paradisiaca (L.)	Leaf	-
Nerium indicum (Mill.)	Leaf	-
Nicotiana tabocum (L.)	Leaf	2.24 ± 1.44
Nychtenthus arbor-tristis (L.)	Leaf	-
Ocimum basilicum (L.)	Leaf	32.34 ± 1.14
Ocimum sanctum (L.)	Leaf	48.46 ± 0.82
Onosoma echinoids (L.)	Pod	-
Lawsonia alba (Leaf) + *Acacia arabicae* (Leaf)	88.64 ± 0.42	

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