

Comparative Analysis and In-vitro Antifungal Activities of Myrtaceae Aqueous Extracts

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Abstract: The present research work involved antifungal analysis of leaf aqueous extract of trees and plants of Myrtaceae family. The aqueous extracts of *Psidium guajava*, *Syzygium cumini*, *Aegle marmelos*, *Nyctanthes arbor-tristis*, *Callistemon lanceolatus*, *Citrus limonum*, *Combretum indicum*, *Calliandra haematocephala*, *Polyalthia longifolia* were made from the leaves of the plants and were tested against a no. of plant pathogenic fungi namely, *Alternaria alternata*, *Alternaria pori*, *Alternaria solani*, *Aspergillus Niger*, *Aspergillus flavus*, *Penicillium crysogenum*, *Colletotrichum capsici*.

The present In-vitro study demonstrated that extracts 80% conc. of aqueous extracts show maximum antifungal activity against *Aspergillus Niger*. Maximum all plant leaf extracts show maximum zone of inhibition but *Aegle marmelos* show maximum result against *Alternaria alternata*, *Aspergillus Niger*, & in 50% conc. *Polyalthia longifolia* show maximum antifungal against *Alternaria alternata*. Maximum 80% conc. of aqueous leaf extracts was found more effective compare to 50% conc. of aqueous extracts against *Alternaria alternata*, *Aspergillus Niger*.

Keywords: Medicinal plant, Antifungal activity, aqueous extracts, plant pathogens.

I. INTRODUCTION

Plants contain various bioactive compound and different plant antifungal protein and peptides, which show antifungal activity against plant and human pathogens. Different parts of plants like root, bark, seeds, fruits, leaves, and stem contain lots of medicinal properties which are very useful for human beings and in agricultural field. In our daily life plant extracts can be used as nutritive supplement, as antioxidant in tea, as beauty product cream, it's contain so many pharmaceuticals value. Fungi from the largest group among micro-organisms causing seed damage a various growth stages. Fungi are eukaryotes and thus have protein and nucleic acid synthesis machinery similar to that of higher animals. It is, therefore, difficult to find compounds that selectively inhibit only fungal metabolism and not the growth and metabolism, of humans or plants. There is lack of effective and safe antifungal drugs and fungicides. Therefore, there is a pressing need of non-toxic and effective antifungal compounds. Since many synthetic fungicides which are used against fungal infection not only pollute the environment factor but are also harmful for human health. Fungi are significant destroyers of foodstuffs and grains during storage, rendering them unfit for human consumption by retarding their nutritive value and often by producing mycotoxins (Park et.al 2004, Koirala et al, 2005, Domijan et al 2005). Plant contain so many secondary metabolites which are responsible for antimicrobial, antifungal activity. The present investigation was undertaken to evaluate the antifungal activity of aqueous extract of different Myrtaceae trees.

II. MATERIAL AND METHODS

A. Collection of Plant Materials

Fresh parts of different nine plant leaves were collected from different parts of greater Noida & Noida city. The apparently healthy parts of these plants were thoroughly 2-3 times with tap water and once with sterile distilled water, and used for extraction.

B. Preparation of Extracts

Aqueous Extracts

Extracts were prepared by simple method. Collected plant parts were shade dried and ground to a fine powder using grinder mixer.

For 50% & 80% aqueous prepared 5gm, & 8gm of air dried plant material crushed in 10ml of sterile water in pestle mortar and incubate for overnight for complete evaporation of aqueous and later dry in oven. This dry mixture mixed with 10ml of aqueous and filtered with Whatman's filter paper no.1. The filtrate was collected and store at 4°C in sterile tubes.

C. Preparation of Test Organisms of Antifungal Studies

Fungal pathogens were isolated on PDA medium from different identified fungal culture were isolated and pure culture of each fungi made separately on PDA slants. These pure cultures were used for further investigation.

D. Antifungal Activity Testing

The antifungal activity was performed by agar plate method. 20ml of agar-media was poured in sterilized Petri dishes and allowed to solidify for at least 20 min. After the solidification one poured Petridis used as a control plate in each antifungal activity test. 50% and 80% solvent aqueous extracts used for antifungal. Blank disc impregnated with 100ul aqueous solvent followed by drying off for 10-15 min. Then pure cultures of fungi were put in the centre of the medium poured in petridishes. The petridishes were incubated for 6 days at BOD at 25°C and the observation were recorded as diameter of Inhibition percentage by comparing the growth of fungi on untreated agar plate.

III. RESULTS & DISCUSSION

The present study involves the analysis of simple aqueous extract of leaves of Myrtaceae family trees and plants. It is well known that trees and plants of Myrtaceae family are known to have medicinal properties against different bacterial diseases. In this study the In vitro testing was carried out against plant pathogenic Fungi namely: *Alternaria alternata*, *Alternaria porri*, *Alternaria solani*, *Aspergillus Niger*, *Aspergillus flavus*, *Penicillium crysogenum*, *Colletrichum capsici*.

It is difficult to find compounds that selectively inhibit only fungal metabolism and not the growth and metabolism of plants also. There is lack of effective and safe antifungal drugs and fungicides. Normally chemical fungicides are used during storage of seeds and crops and also when crops are standing in the fields to prevent and protect them from fungal disease. These chemicals are toxins and when consumed in large quantities cause harm to humans.

Table I. Antifungal activity of different nine plant leaf extract (50%) against plant pathogen

Plant name	Extract conc.	Inhibition Percentage (%)						
		A. <i>porri</i>	A. <i>alternata</i>	A. <i>solani</i>	A. <i>niger</i>	A. <i>flavus</i>	P. <i>chrysogenum</i>	C. <i>caspici</i>
<i>Psidium guajava</i>	50%	75	57	73	47	79	78	60
<i>Syzygium cumini</i>	50%	50	50	56	42	85	82	79
<i>Aegle marmelos</i>	50%	78	62	67	75	77	75	77
<i>Nyctanthes arbor-tristis</i>	50%	69	50	47	67	79	82	57
<i>Combretum indicum</i>	50%	75	50	49	60	84	72	70
<i>Callistemon lanceolatus</i>	50%	75	50	33	66	77	67	66
<i>Polyalthia longifolia</i>	50%	75	83	76	72	71	75	67
<i>Citrus limonum</i>	50%	67	58	50	82	84	75	67
<i>Calliandra haematocephala</i>	50%	57	78	79	50	74	63	50

In the present study 9 different leaf extract were tested against 7 different plant pathogenic fungi. It was observed that all the extracts gave more than 50% inhibition of the fungi when a concentration of 50% extract was used for the test.

Maximum Inhibition was found due to the extract of *Syzygium cumini*, *Nyctanthes arbor-tristis*, *Combretum indicum*, *Polyalthia longifolia* and *Citrus limonum* against *Aspergillus flavus* and *Aternaria alternata*.

Table II. Antifungal activity of different nine plant leaf extract (80%) against plant pathogen

Plant name	Extract conc.	Inhibition Percentage (%)						
		A. <i>porri</i>	A. <i>alternata</i>	A. <i>solani</i>	A. <i>niger</i>	A. <i>flavus</i>	P. <i>chrysogenum</i>	C. <i>Caspici</i>
<i>Psidium guajava</i>	80%	91	67	89	67	81	81	77
<i>Syzygium cumini</i>	80%	71	67	60	67	89	89	90
<i>Aegle marmelos</i>	80%	86	75	78	83	84	88	90
<i>Nyctanthes arbor-tristis</i>	80%	75	75	56	75	85	93	81
<i>Combretum indicum</i>	80%	78	58	60	82	93	77	77
<i>Callistemon lanceolatus</i>	80%	75	67	44	75	80	82	85
<i>Polyalthia longifolia</i>	80%	86	91	91	83	79	86	70
<i>Citrus limonum</i>	80%	89	70	67	83	93	86	77
<i>Calliandra haematocephala</i>	80%	64	80	89	67	85	69	76

When 80% extract of the plant leaves were made it was observed that the inhibition percentages did not increase by double. Thus, very high concentration of the extract is also not required for the antifungal activity to be seen. In certain cases when *Polyalthia longifolia* extract is used, it gave a very high antifungal activity against all the *Alternaria* fungal strains i.e. *Alternaria alternata*, *Alternaria porri*, *Alternaria solani*. Inhibition against seed storage disease caused by *Aspergillus niger* was also observed to a level of 83-83 % by extracts of *Aegle marmelos*, *Combretum indicum*, *Polyalthia longifolia* and *Citrus limonum*.

IV. CONCLUSION

Fungal infections are very serious global problem for humans as well as and during seed storage and in crop production. Fungi produce mycotoxins during storage which can be harmful for everyone that why this study was undertaken to analysis antifungal activity found in Myrtaceae family. The extracts of *Psidium guajava*, *Aegle marmelos*, *Combretum indicum*, *Polyalthia longifolia* and *Citrus limonum* were found to be most effective as Antifungal compound and they can be used for developing formulations for ecofriendly and plant originated fungicide. These plant produce do not cause chemical toxicity to humans and animals who are still involved for work in factories which make fungicide.

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