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## Bioassay of neem leaf extracts against some fungal pathogens under *in-vitro* condition

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### Abstract

Neem (*Azadirachta indica* A. Juss.) is perhaps the most versatile medicinal plant with multifarious uses, as pesticides, insecticides, fungicides, bactericides and also as powerful agent for treating a variety of human ailments and disorders. The fungi toxicity of *Azadirachta indica* was evaluated against ten fungal pathogens with different leaf extract forms viz., powder form, crude form, boiled form and ethanol form. The results reveal that all the four forms of neem part extracts significantly inhibited the growth of all above test organisms but none of the forms could absolutely inhibit the growth of any one of the test fungus. The boiled extract was found significantly superior over other forms for inhibiting the growth of *Rhizoctonia bataticola*, *Alternaria cyamopsides*, *Tolyposporium penicillariae* and *Sclerotinia sclerotiorum*. This supports the use of boiled neem leaf extract for the control of these fungi. The growth of both the species of *Fusarium*, *Colletotrichum gleosporioides* and *Phoma sorghina* was more effectively inhibited under its crude form than the other three forms. These suggest the use of crude extract of neem for the control of *F. oxysporum* f.sp. *ciceri*, *Phoma sorghina*, *F. oxysporum* f.sp. *pallidoroseum* and *C. gleosporioides*, while the powdered form of neem leaf extract was found more suitable for the control of *Sclerotium*.

**Keywords:** Neem leaf, some fungal pathogens, *Azadirachta indica*

### Introduction

Neem (*Azadirachta indica* A. Juss.) tree also known as "Indian Lilac" belongs to the family *Meliaceae*, has attracted special interest of scientists due to the presence of a variety of bioactive compounds. The tree is popularly called the "wonder tree" as it is used to cure a large number of diseases, both traditional as well as modern medicine system make use of neem tree parts like leaves, bark, seed, fruit to manufacture products right from skin care to oral care, from pharmaceuticals to pesticides and manure. Neem and various other botanicals are gaining importance in crop protection in view of their selective properties, low cost and safety to ecosystem. Many botanicals have been identified to be effective in the control of plant diseases. Among the 5280 species tested, 1134, 346 and 92 plant species possessed insecticidal, fungicidal and bactericidal properties respectively (Ahmed and Grainge, 1982) [2]. Neem has a great potential to control various phytopathogenic fungi and therefore, has much prospect to be used as a good fungicide. Ethanol extracts of *A. indica* showed fungal toxic properties against *Alternaria brassicicola* and *F. oxysporum* (Shivpuri *et al.*, 1997) [10]. Therefore, the development of bio-pesticides has been focused as a viable disease control strategy. In previous years plant extracts and essential oils show antifungal activity against a wide range of fungi (Grane and Ahmad, 1988. Wilson *et al.*, 1997 and Abd-Alla *et al.*, 2001) [7, 11, 1]. In order to assess the fungitoxic properties of neem against different fungal pathogens.

### Material and method

The experiment was done in the laboratory of Plant Pathology, College of Agriculture, Gwalior. Ten fungal pathogens viz., *Rhizoctonia solani*, *Phoma sorghina*, *Colletotrichum gleosporioides*, *Fusarium pallidoroseum*, *F. oxysporum* f. sp. *ciceri*, *R. bataticola*, *Sclerotium rolfsii*, *Sclerotinia sclerotiorum*, *Alternaria cyamopsides* and *Tolyposporium penicillariae*.

The different leaf extract forms viz., powder form, crude form, boiled form and ethanol form was mixed aseptically in melted potato dextrose agar medium in appropriate proportions and autoclaved. Twenty ml of the medium is poured in each 10 cm diameter petriplate and solidified. One disc (7 mm) of the medium containing fungal culture of the pathogen was cut from the 7 days old culture and was transferred in the centre of the petriplate under aseptic

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condition. The inoculated plates were incubated at 25-28 °C and growth of the pathogen measured at the interval of 24 hours. The medium without plant extract was used as control.

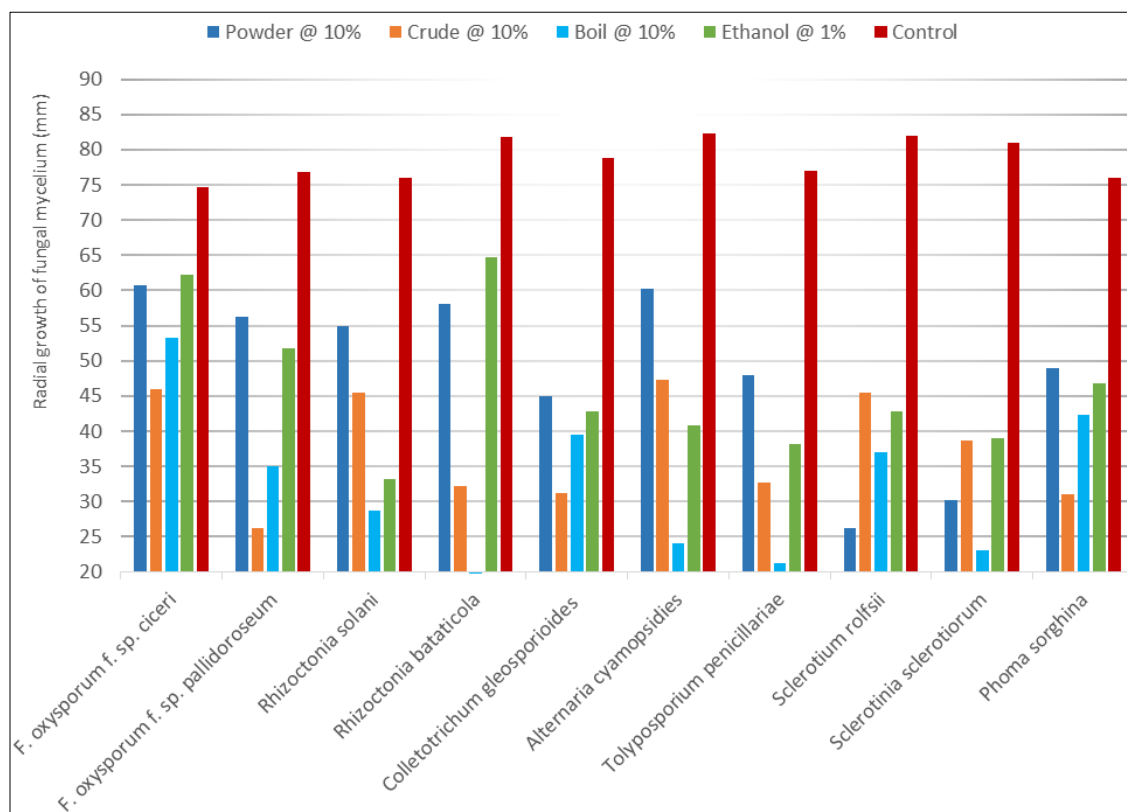
## Results and Discussion

Investigations on the antifungal activity of neem plant parts extracts of the selected plants revealed inhibitory effect of the extracts against the pathogen (Fig. 1). The effect of differences in the present study the fungitoxicity of *Azadirachta indica* (neem) was evaluated in the form of crude (10%), powder (10%), boil (10%) and ethanol (1%) extracts against ten fungal pathogens viz., *Fusarium oxysporum* f.sp. *ciceri*, *Rhizoctonia solani*, *Rhizoctonia bataticola*, *Colletotrichum gleosporioides*, *Tolyposporium penicillariae*, *Sclerotinia sclerotiorum*, *Phoma sorghina*, *F. oxysporum* f.sp. *pallidoroseum*, *Sclerotium rolfisii* and *Alternaria cyamopsides* under *in-vitro* condition. The results reveals that all the four forms of neem leaf extracts significantly inhibited the growth of all above test organisms but none of the forms could absolutely inhibit the growth of any one of the test fungus (Table 1). The boil extract was found significantly superior over other forms for inhibiting the growth of *R. bataticola*, *A.*

*cyamopsides*, *T. penicillariae* and *S. sclerotiorum*. The growth of both the species of *Fusarium*, *C. gleosporioides* and *P. sorghina* was more effectively inhibited under its crude form than the other three forms. These suggest the use of crude extract of neem for the control of *F. oxysporum* f.sp. *ciceri*, *P. sorghina*, *F. oxysporum* f.sp. *pallidoroseum* and *C. gleosporioides*, while the powdered form of neem leaf extract was found more suitable for the control of *S. rolfisii*. The fungitoxicity of *A. indica* leaf extract against *Fusarium* was also reported by Bansal and Gupta (2000) [4] and Dwivedi and Shukla (2000) [6]. Rajput (2000) [8], Dubey (2001) [5] and Sharma (2004) [9] inhibited the growth of *T. penicillariae*, *A. tegitica* and *A. cyamopsides* respectively by the leaf extract of neem. Alkhail (2005) [3] reported strong antifungal activity of neem against *F. oxysporum* and *R. solani* and *Botrytis cinerea*. Neem parts extracts of some medicinal plants in our study also exhibited significant effect against some fungal pathogens. On the basis of present study, it is concluded that leaf extract of the plants which have been found effective against collar rot can be recommended against the disease after in field trials.

**Table 1:** *In-vitro* evaluation of different plant forms of neem extracts against different fungal pathogens.

Pathogens	Plant forms of neem extracts			
	Neem Bark @ 10%	Neem Seed @ 5%	Neem Oil @ 1%	Control
<i>F. oxysporum</i> f. sp. <i>ciceri</i>	59.00	51.00	48.00	74.00
<i>F. oxysporum</i> f. sp. <i>pallidoroseum</i>	39.00	44.00	49.00	77.00
<i>Rhizoctonia solani</i>	44.00	62.00	37.00	78.00
<i>Rhizoctonia bataticola</i>	54.00	46.00	35.00	81.00
<i>Colletotrichum gleosporioides</i>	52.00	41.00	37.00	67.00
<i>Alternaria cyamopsidies</i>	42.00	47.00	41.00	71.00
<i>Tolyposporium penicillariae</i>	44.00	39.00	37.00	82.00
<i>Sclerotium rolfisii</i>	65.00	47.00	39.00	74.00
<i>Sclerotinia sclerotiorum</i>	50.00	56.00	43.00	83.00
<i>Phoma sorghina</i>	43.00	51.00	48.00	71.00



**Fig 1:** *In-vitro* evaluation of different plant forms of neem extracts against fungal pathogens.

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