

# Utilization of Medicinal Plants to Control Seed Borne Pathogens of Legumes Seeds

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**Abstract:** In an exploration for plant extracts with powerful antifungal activity against seed-borne pathogens of legumes, different medicinal plants effectively controlled the development of seeds caused by *Aspergillus flavus*, *Aspergillus niger*, *Alternaria alternata*, *Alternaria tenuis*, and *Fusarium oxysporum*. The leaf extracts of *Azadirachta indica*, *Ocimum sanctum*, *Polyalthialongifolia*, *Catharanthus roseus*, *Tridaxprocumbens* were tested against pathogenic fungi like *Aspergillus flavus*, *Aspergillus niger*, *Alternaria tenuis*, *Alternaria alternata*, and *Fusarium oxysporum*. Nearly all the extracts were found effective against these fungi. The positive results so obtained were compared with that of the reference *Azadirachta indica*.

**Keywords:** Seed borne pathogens, Medicinal plants and Legume seeds

## I. INTRODUCTION

The plant extracts have been shown to possess biological activity in vitro and in vivo, which justifies research on plant-based medicine focused on the characterization of the antimicrobial activity of these plants [11 & 16]. The presence of antifungal compounds in higher plants has long been known as an important factor in the management of seed-borne pathogens [11]. Such compounds, being biodegradable and selective in their toxicity, are considered valuable for controlling some seed-borne pathogens and plant disease management [17]. The use of medicinal plants in disease treatment and prevention can also be seen as primitive, and their present use can be supported by the traditional optimization of their application in disease control. The use of *Cassia alata* and *Bahunia racemose* is a source of many effective and powerful drugs to control seed-borne and plant pathogens. [10-20].

Almost all the cultivated crops are infected by seed-borne pathogens, causing economic losses. The majority of the diseases are caused by fungi. The biological methods used are for crop disease management. We tried to explore the potential of locally available plants against bacteria and fungi causing diseases of plants and seed-borne pathogens. Observing the success of plants in the Panvel and Udgir regions, it was thought proper to explore the available plant wealth for the efficacy of their antimicrobial potential. This could provide an alternative to the present-day pollution problem of air, soil, water, and residual effects of synthetic pesticides. The present investigation was undertaken to select medicinal plant extracts that could be effective in the development of new tools for the control of seed-borne and plant diseases.

## II. MATERIALS AND METHODS

### Collection of plant materials

The *Azadirachta indica*, *Ocimum sanctum*, *Polyalthialongifolia*, *Catharanthus roseus*, and *Tridaxprocumbens* were collected from Latur and Raigad districts. The identification of plants was confirmed using the flora of Maharashtra (1, 5, 12 & 13). The plants were separated and dried at room temperature. The dried plant parts were crushed to a fine powder and stored at room temperature.



**Source of microorganisms:**

The fungi used were *Aspergillus flavus*, *Aspergillus niger*, *Alternaria tenuis*, *Alternaria alternata*, and *Fusarium oxysporum*; these were the most common and important disease-causing fungi of legume seeds. All these fungi were isolated from their respective host seeds, like Groundnut (*Arachis hypogea* L.), Gram (*Cicer arietinum* L.), pigeon pea (*Cajanuscajan*L.), Green gram (*Vigna radiate* L.), and Black gram (*Vigna mungo* L.), etc., and brought into pure cultures and maintained on PDA (Potato Dextrose Agar).

**Plant Extract preparation**

The effect of plant leaf extract was studied against *Aspergillus flavus*, *Aspergillus niger*, *Alternaria tenuis*, *Alternariaalternata* and *Fusarium oxysporum*. The leaves of these plants were separated and washed with sterile distilled water. 100 g of leaves were crushed by using a mortar and pestle with 10% alcohol. The extract was filtered using muslin cloth. The plant extract is added in 100 mL of 10% ethyl alcohol. The plant extract was boiled till the alcohol was evaporated. The media were poured into sterilized petri petriplates and allowed to solidify. These plates were inoculated with 4 mm discs of *Aspergillus flavus*, *Aspergillus niger*, *Alternaria tenuis*, *Alternaria alternata* and *Fusarium oxysporum* in the center aseptically. These plates were incubated at  $28 \pm 10^{\circ}\text{C}$ . The observations were recorded in the form of linear growth of fungal pathogens in millimeters (mm). The linear growth was measured up to the growth in the control plate when filled completely.

**Statistical analysis:**

Antifungal activity of leaf extracts: the data were statistically analyzed by the method suggested by Panse and Sukhatme [14]. All the experiments were done in three replicates.

**III. EXPERIMENTAL RESULTS**

The effect of leaf extracts was studied on dominant pathogenic fungi, including *Aspergillus flavus*, *Aspergillus niger*, *Alternaria tenuis*, *Alternaria alternata* and *Fusarium oxysporum*. It is clear that when leaf extracts of *Azadirachtaindica*, *Ocimum sanctum*, *Polyalthialongifolia*, *Catharanthus roseus*, *Tridaxprocumbens* were used against *Aspergillus flavus*, *Aspergillus niger*, *Alternaria tenuis*, *Alternaria alternata* and *Fusarium oxysporum*, it affected growth. Alcoholic leaf extract of all plant extracts showed antifungal activity against all test fungi. Maximum antifungal activity was recorded by *Azadirachtaindica*. Leaf extracts of all test plants showed less antifungal activity than the control used.

**Table No.1: Antifungal activity of leaf extracts of some common medicinal plants**

Name of the plants	Diameter of inhibition zone (mm)				
	<i>A. flavus</i>	<i>A. niger</i>	<i>A.tenuis</i>	<i>A.alternata</i>	<i>F.oxysporum</i>
<i>Azadirachtaindica</i> A. Juss	10	12	14	15	16
<i>Ocimum sanctum</i> L.	12	14	16	17	18
<i>Polyalthialongifolia</i> (Sonner.) Thw	14	15	16	18	18
<i>Tridaxprocumbens</i> L.	16	17	18	19	19
<i>Catharanthus roseus</i> (L.)G. Don	17	17	18	19	19
Control	20	21	23	24	25



#### IV. DISCUSSION

Cooke Theodore (1958) published Flora of the Presidency of Bombay Presidency, 2. Cannaceae and Chenopodiaceae Botanical Survey of India. Swaminathan (1975) He has given inaugurated speech address in First Botanical conference, Meerut, India. Singh and Dwivedi (1987) studied effect of oils on *Sclerotium rolfsii* causing root rot of barley. Panse and Sukhatme (1985) observed statistical methods for agricultural workers. Mahadevan (1992) studied Biochemical aspects of plant disease resistance. Elsamra et al. (1996) screened antimicrobial activity of plants belonging to Zingiberaceae family. Naik (1997 & 1998). studied. Flora of Marathwada and Osmanabad. Thippeswamy and Lokesh (1997) studied effect of leaf extracts on seed mycoflora, germination and seedling vigor of sunflower. Ibrahim (1997). observed anti-microbial effects of extracts leaf, stem and root bark of *Anogeissus leiocarpus* on *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli* and *Proteus vulgaris*. Chouksey and Srivastava (2001) observed New constituent from the roots of *Terminalia arjuna*: antifungal agent. Almeida (2003) published Flora of Maharashtra. Ateband ErdoUrul (2003) screened antimicrobial activities of various medicinal and commercial plant extracts. Goun et al. (2003). Screened antibacterial and antifungal activity of Indonesian ethno medical plants. Bajwa & Iftikhar (2005) screened antifungal activity of allelopathic plant extracts VI: in vitro control of fungal pathogens by aqueous leaf extracts of Eucalyptus. *Mycopath.* Makinde, A. A., Igoli, J.O., Tama, L., Shalba, J.J. and Barba, A. (2007). Antimicrobial activity of *Cassia alata*, *African J. Biotech.* 6 (13): 1509-1510. Satish and Raghavendra (2008) observed antifungal activity of a known medicinal plant *Mimusops elengi* L. against grain moulds. Shinde et al. (2009) screened the diversity of antibacterial compounds of *Terminalia* species (Combretaceae). Maridass (2010) screened Antibacterial activity of essential oils of aromatic plants from south India. Yadav and Jalalpure (2010) studied phytochemical screening of various extracts of stem bark of *Bahuniaracemosa plant*.

#### V. CONCLUSION

The antifungal activity was studied by using leaf extracts. The effect of the plant extracts of *Azadirachta indica* A. Juss., *Ocimum sanctum* L., *Polyalthialongifolia* (Sonner.) Thw., *Tridax procumbens* L., *Catharanthus roseus* (L.) G. Don., and *Vitex negundo* L. were observed on the growth of *Aspergillus flavus*, *Fusarium oxysporum*, and *Alternaria tenuis*. It was found that *Azadirachta indica* was found to be most effective. It is concluded that the antifungal activity of leaf extracts of *Azadirachta indica*, *Ocimum sanctum*, *Polyalthialongifolia*, *Catharanthus roseus*, and *Tridax procumbens* and its active constituents would be helpful in treating various kinds of seed-borne diseases.

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#### REFERENCES

- [1]. Almeida, M.R. (2003). Flora of Maharashtra—Vol. 4a. Blatter Herbarium, St. Xavier's College, Mumbai, 196.
- [2]. Ateband, D.A., ErdoUrul, O.T. (2003). Antimicrobial activities of various medicinal and commercial plant extracts, *Turk. J. Biol.* 27, 157-162.
- [3]. Bajwa, R. Iftikhar, S. (2005). Antifungal activity of allelopathic plant extracts VI: in vitro control of fungal pathogens by aqueous leaf extracts of Eucalyptus. *Mycopath.* 3 (1 and 12): 7-12.
- [4]. Chouksey, B.K., Srivastava, S.K. (2001). New constituent from the roots of *Terminalia arjuna*: antifungal agent. *Indian J. Chem.* 40 (4): 354-336.



- [5]. Cooke Theodore C.I.E. (1958). Flora of the Presidency of Bombay Presidency, 2. Cannaceae to Chenopodiaceae Botanical Survey of India, Kolkata, 621.
- [6]. Elsamra, T., Shanmugam, J. and Rafi, M.M. (1996). Antimicrobial activity of plants belonging to Zingiberaceae family. *Biomed.* 16 (2/3): 1520.
- [7]. Goun, E., Cunningham, G., Chu D, Nguyen C. and Miles D. (2003). Antibacterial and antifungal activity of Indonesian ethno medical plants. *Fitoterapia.*;74(6): 592-596.
- [8]. Ibrahim, M.B. (1997). Anti-microbial effects of extracts leaf, stem and root bark of *Anogeissus leiocarpus* on *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli* and *Proteus vulgaris*. *Journal of Pharmaceutical and Development.* 2, 20-30.
- [9]. Mahadevan, A. (1992). Biochemical aspects of plant disease resistance. Part I. Performed inhibitory substances. New Delhi: Today and Tomorrow's Printers and Pub. 425-431.
- [10]. Makinde, A. A., Igoli, J.O., Tama, L., Shalba, J.J. and Barba, A. (2007). Antimicrobial activity of *Cassia alata*, *African J. Biotech.* 6 (13): 1509-1510.
- [11]. Maridass, M. (2010). Antibacterial activity of essential oils of aromatic plants from south India. *Int. J. Adv. Pharm. Sci.* 1: 176-180.
- [12]. Naik VN. (1998). Flora of Marathwada—Vols. 1 & 2. Amrut Prakashan, Aurangabad,
- [13]. Naik VN. (1997). Flora of Osmanabad. Venus publishers, Aurangabad, 464. 11.
- [14]. Panse, V.G. and Sukhatme, P.V. (1985). Statistical methods for agricultural workers. ICAR. New Delhi.
- [15]. Satish, S., Raghavendra, M.P. (2008). Antifungal activity of a known medicinal plant *Mimusops elengi* L. against grain moulds, *Journal of Agricultural Technology.* 4(1), 151-165.
- [16]. Shinde, S.L., Junne, S.B., Wadje, S.S., Baig, M.M.V. (2009). The diversity of antibacterial compounds of *Terminalia* species (Combretaceae). *Pak. J. Biol. Sci.* 12 (22): 1483-1486.
- [17]. Singh, R.K. and Dwivedi, R.S. (1987). Effect of oils on *Sclerotium rolfsii* causing root rot of barley. *Ind. J. Phytopath.* 40: 531- 533.
- [18]. Swaminathan, M.S. (1975). Inaugural address, First Botanical conference, Meerut, India. 1-31.
- [19]. Thippeswamy, T. Lokesh, S. (1997). Effect of leaf extracts on seed mycoflora, germination and seedling vigor of sunflower variety APSH 11. *Int. J. Trop. Plants Dis.* 15 (1): 53-58.
- [20]. Yadav, S., Jalalpure, S.S. (2010). Phytochemical screening of various extracts of stem bark of *Bahuniaracemosa* plant. *Int. J. Pharm. Res.* 2(5):1-8.

