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Plant Extracts Effect of Seed born fungi *vigna radiata*

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Abstract

The present study was conducted to isolate and identify seed-borne mycoflora from six varieties of Vigna radiata—BM-4, BPMR-14, JL-781, BPMR-187, Kopargaon, and a local variety. The most frequently isolated fungi included Aspergillus flavus, Aspergillus niger, Alternaria alternata, Curvularia lunata, Cladosporium oxysporum, Fusarium roseum, Macrophomina phaseolina, and Trichoderma viride. These fungi were identified based on colony morphology and microscopic characteristics. To explore eco-friendly approaches for controlling these seed-borne pathogens, selected plant extracts were used in vitro. Leaf, rhizome, and seed extracts of botanicals such as Azadirachta indica (Neem), Curcuma longa (Turmeric), Allium sativum (Garlic), Zingiber officinale (Ginger), and Aegle marmelos (Bael) were evaluated for their antifungal efficacy using the poisoned food technique. The results showed significant inhibition of fungal growth by several extracts, with Allium sativum and Azadirachta indica showing the most promising effects. This study highlights the potential of botanical extracts as natural, sustainable alternatives to chemical fungicides in managing seed-borne fungal pathogens of Vigna radiata.

Keywords*: Vigna radiata, seed-borne fungi, mycoflora, Aspergillus, Fusarium, botanical extracts, antifungal activity, poisoned food technique, eco-friendly control, plant pathology.*

Introduction

Seed-borne fungi significantly impact crop health, productivity, and food safety. Among legumes, Vigna radiata (mung bean) holds substantial nutritional and economic importance in India. However, its cultivation is threatened by various fungal pathogens such as Aspergillus flavus, Alternaria alternata, Fusarium roseum, and Curvularia lunata, which can reduce seed viability and cause post-harvest losses. These fungi are often transmitted through infected seeds, posing a challenge to sustainable crop production. Traditional management of seed-borne fungi relies heavily on synthetic fungicides, which may lead to environmental pollution, pathogen resistance, and health concerns. As an eco-friendly alternative, plant extracts offer promising antifungal properties due to their rich phytochemical content. Botanicals such as Azadirachta indica, Zingiber officinale, Curcuma longa, Aegle marmelos, and Allium sativum have been explored for their bioactive compounds that can inhibit fungal growth. This study aims to isolate and identify the seed mycoflora associated with different Vigna radiata varieties and to evaluate the in vitro antifungal efficacy of selected plant extracts using the poisoned food technique. The findings can contribute to sustainable disease management strategies by promoting the use of natural plant-based alternatives to control seed-borne fungal infections.

Method and material

The antifungal activity of various plant extracts was assessed using the poisoned food technique, with necessary modifications. Fresh plant parts were collected, thoroughly washed, and ground in distilled water using a sterilized mortar and pestle to obtain crude extracts. A pre-sterilized Zapeck Dox agar medium was prepared and allowed to cool to around 45–50°C. The prepared plant extracts were then mixed thoroughly into the molten medium in equal proportion under aseptic conditions. The mixture was poured into sterile Petri dishes and allowed to solidify.

Fungal inoculum was prepared by cutting 7 mm discs from actively growing cultures on Potato Dextrose Agar (PDA), aged 7 days. These discs were placed at the center of each Petri plate containing the plant extract-amended medium. Control sets were maintained by growing fungal discs on the same medium without any plant extracts. All plates were incubated under standard laboratory conditions, and the radial growth of the fungal colonies was measured at fixed intervals. The effectiveness of each extract was determined by comparing the colony diameters with the control, thereby evaluating the degree of growth inhibition.

Results and Dissuction

Aqueous leaf extracts of higher plants were inhibitory to the fungal growth (Table 1,2&3)

Table: 1- Antifungal Activity of Selected Leaf Extracts

Plant part	Plant	Diameter of fungal growth (mm)				
		A.alternata	*A.flavus*	*C.lunata*	*F.roseum*	*T.viride*
Leaf	Control	59	61	64	65	55
	Aegal marmeals	37	33	47	54	39
	Adhathoda vasica	32	22	24	39	37
	Azadirachta indica	28	24	27	34	33
	Parthenium hysterophorus	34	29	43	34	33

Table: 2- Antifungal Activity of Rhizome Extracts

Plant part	Plant	Diameter of fungal growth (mm)				
		A.alternata	*A.flavus*	*C.lunata*	*F.roseum*	*T.viride*
Rhizome	Control	63	65	61	66	58
	Zingiber officinale	39	28	49	53	44
	Curcutma longa	34	27	42	54	24
	Musa paradisiaca	29	35	25	46	60
	Allium Sativum	31	24	54	51	46

Table: 3- Effect of plant seed extracts on growth of fungal

Plant part	Plant	Diameter of fungal growth (mm)				
		A.atternaria	*A.flavus*	*C.lunata*	*F.roseum*	*T.viride*
Seed	Control	72	70	67	74	60
	Cicer arietinum	39	20	44	54	49
	Phaselousaconitifolius	36	21	41	38	36
	Clitoria ternata	31	19	43	36	34
	Vigna uniculata	28	29	35	29	32

Extracts of *Parthenium hysterophorus* was more inhibitory to *Alternaria alternata*, *Azadirachta indica* and *Parthenium hysterophorus* inhibited *Aspergillus flavus*. *Azadirachta indica inhibited curvularia lunata*, whereas *Fusarium roseum* and *Trichoderma viride* showed inhibition due to *parthenium hystrophorus*, *Azadirachta indica*, *Adathoda Vasica*, *Aegle marmelosus*. *Adathoda vasica*, *Aegle marmelous*, Bhowmick and Choudhary (1982) studied that leaf extracts of *Acalypha indica* completely checked by growth of *Alternaria alternata*.

Several researchers have reported the antifungal properties of plant extracts. Varadpande and Sangai (1983) found that seed and whole plant extracts of Glosscordia bosvallex De completely inhibited the radial growth of *Aspergillus niger*. In the present study, aqueous extracts (10% concentration) of fresh rhizomes and bulbs were tested for their inhibitory effects on the mycelial growth of five fungal species isolated from *Vigna radiata* (moong) seeds grown on solid medium. Extracts of *Zingiber officinale* and *Allium sativum* were found to significantly suppress the growth of Aspergillus flavus. Similarly, *Musa paradisiaca* and *Allium sativum* extracts inhibited *Curvularia lunata*, while *Fusarium roseum* showed minimal response to the tested botanicals (Table 2).

Rhizome extract of Curcuma longa effectively suppressed *Trichoderma viride*, although the presence of *Musa paradisiaca* extract appeared to stimulate its growth. El Shami et al. (1986) reported antifungal activity of garlic and clove juice against Fusarium wilt in watermelon. Abraham and Prakasan (2001) also noted that 10% concentrations of leaf extracts from *Azadirachta indica*, *Ocimum sanctum*, and *Vitex negundo* inhibited the growth of *Geotrichum candidum* and *Cladosporium oxysporum*.

In our study, seed extracts (10%) from commonly cultivated leguminous plants were evaluated for their antifungal effects on moong seed-associated fungi (Table 3). *Alternaria alternata* growth was inhibited by *Vigna unguiculata* (cowpea) seed extract, while *Aspergillus flavus* was suppressed by extracts from *Cicer arietinum* (gram), *Phaseolus aconitifolius* (moth bean), and Clitoria ternatea (butterfly pea). *Fusarium roseum* growth was restricted by cowpea extract, and Trichoderma viride by both moth bean and cowpea seed extracts. Kolte and Shinde (1973) highlighted the effectiveness of *Phaseolus mungo* and *P. radiatus* extracts against *Macrophomina phaseolina*, while

Narain and Satapathy (1977) demonstrated the antifungal potential of *Vinca rosea* extract against *Fusarium oxysporum*.

Overall, these findings suggest that plant-derived extracts hold significant promise as eco-friendly alternatives for the biological control of seed-borne fungal pathogens.

Conclusion

The present study highlights the promising antifungal potential of various plant parts—especially rhizomes, bulbs, leaves, and seeds—against common seed-borne fungi associated with Vigna radiata. Extracts from plants such as Allium sativum, Zingiber officinale, Curcuma longa, and leguminous seeds like Cicer arietinum and Vigna unguiculata showed significant inhibitory effects on fungal growth, including species like Aspergillus flavus, Curvularia lunata, and Fusarium roseum. These findings support the use of natural plant extracts as eco-friendly, low-cost alternatives to chemical fungicides in managing seed mycoflora. Further in-depth studies on their mechanisms of action, formulation, and field application may pave the way for sustainable plant disease management practices in organic and traditional farming systems.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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