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Antifungal Activity of Storage Fungi on Some Oil Seeds

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Abstract: -
Storage oilseeds come into contact with a variety of microorganisms in the field and during storage. Oil seeds are sensitive to fungi infection. The present study's purpose was to examine the antifungal activity of extracts from three plant species that are utilized in phytopathogenic fungi. Survey and collection of stored oil seeds soybean, mustard, sesame, niger, castor, and flax seeds collected from several places in Maharashtra's western Vidarbha region. Ten dominant fungi were isolated Alternaria alternata, Alternaria dianthicola, Aspergillus flavus, Aspergillus niger, Curvularia lunata, Chaetomium globosum, Fusarium oxysporum, Macrophomina phaseolina, Penicillium spp, Rhizopus nigricans by Potato Dextrose Agar (PDA), Glucose Nitrate Agar (GNA) and Martin's Rose Bengal Agar (RBA) method. Using agar well diffusion methods, the antifungal efficacy of ethanol and aqueous extracts of Azadirachta indica L *and Calotropis Procera leaf latex against 10 seed-borne dominant fungi were studied. The results showed that all three types of plant extract have an effect on fungi but Azardirecta indica* L *is more effective than the other two plants, The results showed that for antifungal characteristics of Azardirecta indica L, Calotropis Procera latex, ethanol was the best extractive solvent followed by water.*

Keywords: *- Plant material, Antifungal activity, Latex, Ethanol, Fungicide and Seed Born Fungi.*

Introduction

Oilseeds are grown in practically every region of the country. Interestingly, they are considered important oil seeds in some parts of the country. Many developing countries, including India, have recently attempted to improve seed output. Unfortunately, a considerable portion of annual production is lost in storage due to a lack of efficient post-harvest preservation techniques, and these losses have been attributed in part to microbial action in storehouses (Bhattacharya *et al.,* 2002). Plant pathogenic fungi are the most common infectious agents, causing changes during all stages of development including post-harvest. According to Christensen *et al.,* Scientists working on this subject have always been interested in biologically active chemicals found in medicinal plants. Chemical fungicides have a (1969) due to the invasion of microorganisms deterioration happens more rapidly in stored grains, and the losses caused by them are referred to as biodeterioration. The activity of fungi damages the world's stored grain more than that of other microbes (Neergard 1977). In recent years, there has been an increase in interest in studying plants with antibacterial properties (Clark *et al.*, 1993).

The hazardous effects of synthetic chemicals can be minimized through the development of new eco-friendly and effective herbicides. Natural fungicides derived from plant sources would be a far better alternative to these dangerous chemicals (Mishra *et al.,* 2009) negative impact on the environment (Anon, 2005). Plant metabolites and plant-based pesticides appear to be the better options since, unlike synthetic pesticides,

they are recognised to have a low environmental impact and provide a low risk to consumers (Varma and Dubey, 1999). Various plant extracts have been shown to be effective in inhibiting seed-borne diseases (Neerman, 2003). Synthetic fungicides are used to control phytopathogenic fungus in most cases; however, due to the harmful effects of pesticides on human health and the environment, their usage is becoming increasingly limited (Harris *et al* .,2001) Several studies have shown that various plant tissues, such as roots, leaves, seeds and flowers, exhibit inhibitory effects against bacteria, fungi, and insects in laboratory tests (Davicino *et al*., 2007). A huge number of plants belonging to the angiosperm and gymnosperm families have been screened for their fungi toxic characteristics by various researchers Manoharachary and Gourinath (1991). According to Hooda and Srivastava (1998), Natural fungicides show low environmental toxicity when compared to synthetic compounds. Natural chemicals are less phytotoxic, biodegradable, and more systematic than synthetic compounds (Saxena *et. al*., 2005). There is currently little support for the medicinal plants under investigation's antifungal capabilities against phytopathogen fungi**.** The antifungal activity of solvent extraction of *Azadirachta indica* L leaf and *Calotropis procera* L latex was investigated and compared to that of a standard fungicide against *Alternaria alternata, Alternaria dianthicola, Aspergillus flavus, Aspergillus niger, Curvularia lunata, Chaetomium globosum, Fusarium oxysporum, Macrophomina phaseolina, Penicillium spp, Rhizopus nigricans.*

MATERIAL AND METHODS

Plant material

From the western Vidarbha region healthy and ripe leaves of *Azadirachta indica* L and *Calotropis procera* L latex were gathered. Fresh leaves were cleaned in sterile distilled water, dried in the open air, then crushed into a fine powder, and stored in airtight bottles (Manoorkar *et al.,* 2015).

Latex

Early in the morning, fresh latex of *C. procera* was collected aseptically in clean glass tubes from the aerial sections of a healthy plant. A latex sample was given to the lab. At 42°C, the latex sample was dried in the oven. Using a mortar and pestle, dried latex was crushed, making a fine powder. Roko a chemical fungicide was purchased from certified agrochemical shops in Bandana local market (Manoorkar *et al*., 2015).

Preparation of Extraction:

Ethanol and water were used as solvents for the extraction. 10 gm of dried leaves and latex were properly weighed and dissolved in 100 ml of ethanol in an airtight cork bottle. The suspended solutions were maintained in a rotary shaker for 24 hours, with the supernatant dried and the aqueous extract dried in a water bath. For bioassays, the dried extract was utilized and stored at 4°C until used (Parekh, 2007).

Agar well diffusion method:

Understudy in-vitro, screening of antifungal activity was carried out. As well as crude extracts (ethanoic, methanolic and aqueous) of 10 plant parts against the above 10 pathogenic fungal strains were evaluated by using the agar well diffusion method (Jain, 2010). The cultures of fungi were maintained on Sabouraud dextrose agar. Each of the diluted cultures was swabbed on sterile SDA plates separately by using sterile cotton swabs. The plates were dried for 30 minutes at room temperature. A well with a diameter of 6 mm was made using a sterile cork borer. The bottoms of the wells were sealed by pouring 20-50 µl of molten SDA into the scooped outwells. From the prepared extract of solvents methanol and ethanol 100 µl was poured in the first two well and 150 µl were added to another two

wells. Roko is used as a standard fungicide at 50 ppm.

Table no. 1 Antifungal activity of *Azadirachta indica* L plant leaves extract against seed-borne fungi

Sr. No	Test Fungi	Inhibitory zone (mm)		
		Plant Leaf extract		Roko (Fungicide)
		Aqueous	Ethanol	
1	*Alternaria alternata*	07	10	25
2	*Alternara dianthicola*	09	11	23
3	*Aspergils flavus*	10	13	26
4	*Aspergils niger*	08	12	28
5	*Curvulara lunata*	06	09	24
6	*Chaetomum globosm*	08	10	22
7	*Fusarium oxysporum*	11	13	29
8	*Macrophomina phaseolia*	06	13	31
9	*Penicillim spp*	09	10	30
10	*Rhizopus nigricans*	09	11	32

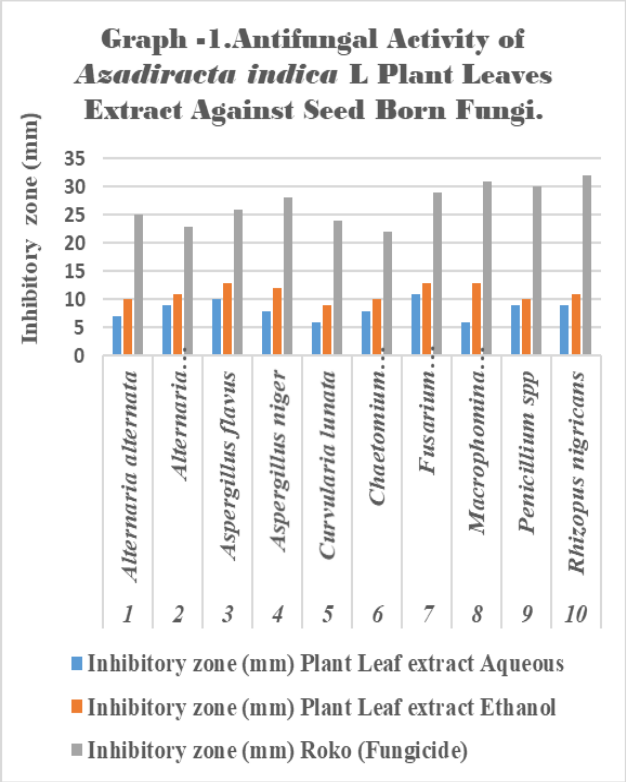
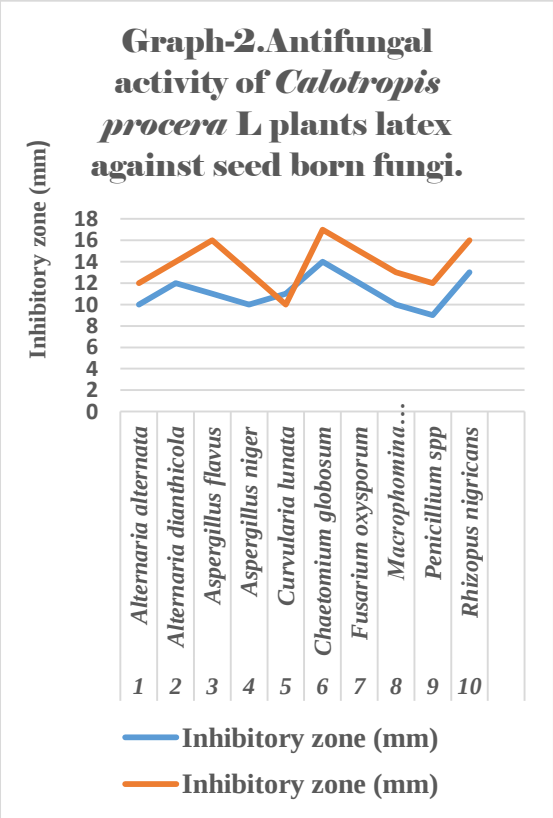


Table no- 2 Antifungal activity of *Calotropis Procera* L. latex against seed-borne fungi.

Sr.No	Test Fungi	Inhibitory zone (mm)	
		Plant latex extract	
		Aqueous	Ethanol
1	*Alternaria alternata*	10	12
2	*Alternaria dianthicola*	12	14
3	*Aspergillus flavus*	11	16
4	*Aspergillus niger*	10	13

5	*Curvularia lunata*	11	10
6	*Chaetomium globosum*	14	17
7	*Fusarium oxysporum*	12	15
8	*Macrophomina phaseolina*	10	13
9	*Penicillium spp*	09	12
10	*Rhizopus nigricans*	13	16



RESULTS AND DISCUSSION

According to a recent study, several chemical compounds found in large levels in a variety of plants have antioxidant, antifungal, antibacterial and anti-inflammatory activities (Shalini and Srivastava, 2009).

Table no and Graph no.1 show, that the ethanolic and aqueous leaf extracts had the largest inhibitory zones (11 and 13 mm, respectively) against *Fusarium oxysporum*. *Curvularia lunata* was found to have the lowest zone of inhibition, (06mm and 09 mm respectively). The study indicates that the leaves of *Azadirachta indica* L have fungicidal properties against the test fungi. In comparison to aqueous extraction, the results in the table showed that ethanol was the superior solvent for extracting antifungal compounds from this plant. According to Ghosh *et al* .,(2020) Tulsi and Neem leaf extracts showed the greatest prevention of mycoflora infection, followed by datura leaf extract, leaf showed the least amount of inhibition against seed-borne mycoflora. Antifungal activity was observed by *Azadirachta indica* and *Polyalthia longifolia* against *Macrophomina phaseolina, Rhizopus stolonifer* and *Penicillium digitatum* (Kakde and Chavan 2011).

The research found that *C. Procera* latex has fungicidal properties in test organisms. In comparison to aqueous extraction, the results in the table showed that ethanol was the strongest solvent for extracting antimicrobial

substances from this plant. Using agar well diffusion methods, the same effect was obtained against seed-borne dominant fungi *Cuvularia lunata, Alternaria alternata, Rhizoctonia solani, Fusarium solani, Penicillium chrysogenum, Aspergillus niger, A. flavus, A. terrus, A. fumigatus* and *Rhizopus sp* (Manoorkar et al., 2015). Table no 2 shows that ethanolic latex extracts showed the highest inhibition of *Aspergillus flavus, Rhizopus nigricans* (16 mm) and *Chaetomium globosum* (17 mm) in a wide zone. Lowest inhibition of *C procera* latex in *Penicillium spp* (9 mm and 12 mm). The sizes of inhibitory zones ranged from 06 mm to 17 mm, with considerable variations in their activity depending on the microorganism tested and the solvent used. According to Kareem *et al.* (2008), the latex of *Calotropis Procera* has a considerable inhibitory impact on fungal strains. According to Varahalarao *et al.,* (2010) investigated bioassays for antimicrobial activities of *C. procera* stem, leaves, and flowers, the antimicrobial activities of organic solvent extracts were tested on a variety of test organisms including *Alternaria alternata, Aspergillus niger, Aspergillus flavus, Bipolaris bicolar, Curvlaria lunata, Penecillium expansum and Rhizpctonia solani.*

CONCLUSION

Microbial contamination of storage oil seeds has become an increasing source of concern among farmers, since it has an impact on germination percentage viability and seed health as well as nutritional properties. Pathogens in stored oilseeds have been recognised as key factors affecting economic losses in recent years, with the identification of a few main things based on their symptoms, in the present study antifungal activity was found in the leaves extract of *Azadirachta indica* L*,* and *Calotropis Procera* latex. To protect stored oil seeds from fungi we can protect them by using different plant material extract for eco-friendly management as compared to fungicides, fungicides are very harmful to living organisms and the environment.

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