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Antifungal properties of plant latex against stored oilseeds fungi

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Abstract
The oilseeds become infected with a range of field and storage fungi, as well as a number of seed-borne diseases. Seed damage during numerous processes ranging from crop maturity to harvesting, threshing, processing and storage. Poor farmers, store the preserved oilseeds for consumption and sowing the next season. The traders stored oil seeds in godown, warehouses, markets etc., for a few years in anticipation of the higher price of oilseeds. Storage oilseeds come into contact with a variety of microorganisms in the field and during storage. A fungus was found most dominant in storage oilseeds. The present study purpose was to examine the antifungal activity of latex from two plant species that are utilized in phytopathogenic fungi. Survey and collection of stored oil seeds soybean, mustard, sesame, Niger, castor, flax seeds collected from several places in Maharashtra's western Vidarbha region. Oil-seeds are sensitive to fungi infection. Ten dominant fungi were isolated from stored oilseeds. Agar well diffusion methods for the antifungal efficacy of ethanol and aqueous latex of *Calotropis procera* L and *Aloe vera* L latex against 10 seed-borne dominant fungi was studied. The results showed that for antifungal activity ethanol latex was the best effective solvent as compare to aqueous. *Aloe vera* L and *Calotropis procera* L ethanol latex was shows very dominant inhibitory zone against *Aspergillus flavus* and *Curvularia lunata* respectively.

Keywords: Plant latex, ethanol, fungicide and fungal culture

Introduction
Oilseeds play a very important role in the production of a healthy crop in agriculture. About 90% of the crops all over the world are produced by using seeds. Seeds in the field as well as in ill storage conditions interact with several microbes, which deteriorate the seeds Welbaum, 2006) [14]. The destruction of stored seeds is mostly due to the destructive action of fungi, insects and rodents, all of which are influenced by storage conditions. Microorganisms, particularly fungi, play an important role in the degradation of stored seeds, but because of their quiet character, they go overlooked Mukherjee *et al*., 1968; Christensen and Kaufrnann, 1969) [2]. Fungi infect seeds during harvesting, gathering and storage because they are so common in nature. Harvesting, handling, storage, processing and distribution practices expose food to the fungus that creates mycotoxin Shukla and Singh, 2006).Seeds are also harmed by a variety of causes, including postharvest and storage disease fungi as well as unfavorable environmental circumstances. Pathogens that infect seeds present a significant hazard to crop establishment and productivity Ebimieowei Etebu, *et al*., 2017) [3]. Scientists working in this subject have always been interested by biologically active chemicals found in medicinal plants. Chemical fungicides have a negative impact on the environment Anon, 2005) [1]. Plant metabolites and plant-based pesticides appear to be one of the better options since, unlike synthetic pesticides, they are recognized to have a low environmental impact and provide low risk to consumers Varma and Dubey, 1999) [13]. Various plant extracts have been shown to be effective in inhibiting seed-borne diseases Neerman, 2003) [8]. According to Hooda and Srivastava 1998) [4] 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) [11]. There is currently little support of the medicinal plants under investigation's antifungal capabilities against phytopathogen fungi.

The antifungal activity of solvent extraction of *Calotropis procera* L and *Aloe vera* L latex was investigated and compared to that of a standard fungicide Roko against fungi, *Alternaria alternate, Alternaria dianthicola, Aspergillus flavus, Aspergillus niger, Curvularia lunata, Chaetomium globosum, Fusarium oxysporum, Macrophomina phaseolina, Penicillium spp, Rhizopus nigricans*. *Aloe vera* L and *Calotropis procera* L ethanol latex was shows very dominant inhibitory zone against *Aspergillus flavus* and *Curvularia lunata* respectively.

Material and methods
Latex
Early in the morning, fresh latex of *Calotropis procera* L and *Aloe vera* L was collected aseptically in clean glass tubes from the aerial sections of a healthy plant. A latex sample was given to the laboratory. Roko a chemical fungicide was purchased from certified agrochemical shops in Buldhana local market Manoorkar V.B *et al*., 2015) [6].

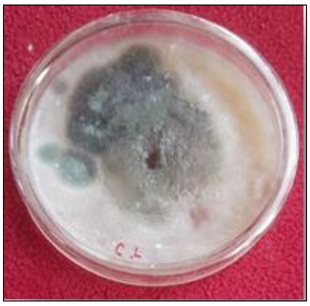
Preparation of extraction
10 ml latex were properly weighed and dissolved in 100 ml of ethanol in an airtight cork bottle. The suspended solutions were maintained in a rotary shaker for 24 hours with the supernatant dried and the aqueous extract dried in a water bath. For bioassays, dried extract was utilized and stored at 4°C until used Parekh, 2007) [9].

Agar well diffusion method
Under study *in-vitro*, screening of antifungal activity was carried out. As well as crude extracts ethanoic and aqueous) of two part against above 10 pathogenic fungal strains were evaluated by using agar well diffusion method Pundirand

Jain, 2010) [10]. The cultures of fungi were maintained on Sabouraud dextrose agar. Each of the diluted culture 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 diameter 6 mm was made using sterile cork borer. The bottoms of the wells were sealed by pouring 20-50 µl of molten SDA into the scooped-out wells. From the prepared extract of solvents methanol and ethanol 100µ1 was poured in first two well and 150µl were added to another two wells. Roko is used as standard fungicide at 50 ppm.

Table 1: Antifungal activity of *Aloe vera* L latex against seed- borne fungi

Sr. No	Test Fungi	Inhibitory zone mm)		
		Plant Latex		Roko (Control)
		Aqueous	Ethanol	
1	*Alternaria alternata*	--	10	24
2	*Alternaria dianthicola*	--	11	22
3	*Aspergillus flavus*	--	14	25
4	*Aspergillus niger*	--	12	26
5	*Curvularia lunata*	--	09	21
6	*Cercosporasesani*	--	10	24
7	*Fusarium oxysporum*	--	13	23
8	*Rhizopus nigricans*	--	11	27
9	*Macrophomina phaseolina*	--	13	25
10	*Penicillium spp*	--	10	26



Calotropis procera L against *Curvularia lunata.*

Aloe vera L against *Aspergillus flavus*

Table 2: Antifungal activity of *Calotropis procera* L latex against seed- borne fungi.

Sr. No	Test Fungi	Inhibitory zone mm)		
		Plant latex		Roko Control)
		Aqueous	Ethanol	
1	*Alternaria alternata,*	--	11	21
2	*Alternaria dianthicola*	--	13	24
3	*Aspergillus flavus*	--	13	23
4	*Aspergillus niger*	--	10	20
5	*Curvularia lunata*	--	15	18
6	*Cercosporasesani*	--	11	21
7	*Fusarium oxysporum*	--	14	25
8	*Rhizopus nigricans*	-	12	19
9	*Macrophomina phaseolina*	--	11	22
10	*Penicillium spp*	--	10	24

Results and discussion

According to a recent study, several chemical compounds found in large levels in a variety of plants have antifungal, antibacterial, and anti-inflammatory activities Shalini and Srivastava, 2009) [12].

Table no 1 shows that, the ethanolic latex was found the largest inhibitory zones against *Aspergillus flavus, Fusarium oxysporum* and *Macrophomina phaseolina.* While, *Curvularia lunata* was showed to have the lowest zone of inhibition. Aqueous latex was not shows any inhibitory zone. The study indicates that the latex of *Aloe vera* 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. Methanol, ethanol and water extracts from *Blumealacera* leave demonstrated outstanding antifungal action against *Aspergillus flavus, Aspergillus niger, Aspergillus paraciticus* and *Aspergillus oryzae* reported by Kagne *et al.,* 2012) [5].

The Aqueous and ethanol latex of *Calotropis procera* L was shows in *Curvularia lunata* more effective ethanoic latex. While aqueous latex was not shows zone of inhibition The research found that *Calotropis procera* L 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 spp* reported by Manoorkar V.B *et al*., 2015) [6].

Conclusion

Pathogens in stored oilseeds have been recognized as key factors affecting economic losses in recent years, with identification of a few main things based on their symptoms, in the present study antifungal activity was found in the latex of *Aloe vera* L and *Calotropis procera* L. To protect stored oilseeds from fungi we can protect them by using plant latex for ecofriendly management as compare to fungicides. Fungicides are very harmful to living organisms and environment.

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