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RESEARCH ARTICLE

Antifungal Activity of *Semecarpus anacardium* Linn. Oil against Selected Phyto-pathogenic Fungi.

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ABSTRACT

The present study was undertaken to evaluate in-vitro antifungal activity of *Semecarpus anacardium* Linn. oil against four fungal pathogens, viz. *Curvularia penniseti*, *Curvularia lunata*, *Fusarium oxysporum* f. sp. *ciceris* and *Helminthosporium maydis* using poisoned food technique. The DMSO extract of *S. anacardium* oil was found to be more or less active against almost all tested pathogenic fungi with varied spectrum of reduced growth. *C.lunata* has shown 93.3% inhibition and *F. oxysporum* and *H. maydis* has shown 94.4% inhibition and 100% mycelial inhibitions at 15% and 18% concentrations of the extract respectively. Whereas, *C. penniseti* was found to be quite sensitive that showed 88.9 inhibitions at 10% concentration but it showed 100% inhibition at 18% concentration.

Keywords: Antifungal activity, *Semecarpus anacardium* Linn., phyto-pathogenic fungi.

INTRODUCTION

Semecarpus anacardium Linn. is a deciduous tree belonging to family Anacardiaceae, distributed in the Himalayan and Sub-Himalayan region of India. It is commonly known as marking nut and ''Bhallataka''. It is widely used as an herbal drug in Ayurvedic and Unani medicines since ancient times (Chopra, 1982; Khare, 1982; Nardkarni, 1993). It is a medium sized tree that grows upto 12-15 m high, bark 5-6 mm thick, grey to grayish brown with scales and furrows. It is highly medicinal and reported to show effects such as caustic, astringent, anti-rheumatic, vesicant and used in anorexia, cough, asthama, indigestion, ulcer, piles and various nervous diseases. It is oftenly used as home remedy for inflammation, arthritis, warts and rheumatism (Raghunath R. and Mitra R. 1982).

It is also known to possess anticancer, immune-modulatory and antibacterial activity (Indap, Ambaye and Gokhale 1986; Balchandran P and Panchanathan S. 1988; Nair A and Bhide S. V. 1996).

The plant is reported to show antimicrobial activities against human pathogens but it has a very few reports on plant pathogens so, the present study aimed to investigate its antifungal activity against four plant pathogenic fungi that were isolated from four different crop plants.

MATERIALS AND METHODS

DMSO extract of *Semecarpus anacardium* Linn. oil

Crude oil *Semecarpus anacardium* Linn. was diluted with equal volume of DMSO (Dimethyl sulphoxide) in 1:1 proportion and it is made into eight different concentrations viz... 1%, 2.5%, 7%, 10%., 12%, 15% and 18% concentration that were used for further study.

Isolation and Identification of the fungal pathogens

The infected parts of crop plants namely Jowar, Bajra, Maize and Chick pea were brought to the laboratory and the target spots were washed with sterilized distilled water and then with 1% sodium hypochlorite solution.

Diseased samples were sterilized properly and subsequently the spots were plated on sterilized Petri plates containing PDA (Potato Dextrose Agar) which were then subjected for incubation at room temperature (28-30^{0}C) and observed to grow for seven days. The fungi were identified by mounting on slides and observed under microscope by using standard taxonomic keys and monographs.

Pathogenicity Test

Pathogenicity test was carried out following Koch's postulates. Healthy plant parts (roots, leaves and inflorescence) were sterilized properly and inoculated with the isolated fungi and observed for the occurrence of symptoms.

Antifungal Activity

It was carried out by poisoned food technique. Eight different concentrations of the DMSO extract of *Semecarpus anacardium* Linn. oil were poured in the sterilized petridishes. 2 mm discs of the fully active seven days old culture of the fungal pathogens were inoculated on the Petri plates containing the extract aseptically. Subsequently the inoculated Petri plates were subjected to incubation at 28^{0}C - 30^{0}C and observed for the growth of the pathogens.

The results of the mycelial growth inhibition were expressed in percent inhibition over control using the formula given by Vincent (1947).

$$I = \frac{100\ (C - T)}{C}$$

Where, I = Inhibition of mycelial growth (%)
C = Growth of mycelium in control
T = Growth of mycelium in treatment

Pathogenicity Test

Pathogenicity test was carried out as per Koch's postulates. After inoculating isolated fungi in the healthy plant parts, they developed the symptoms as the diseases. The fungi were again re-isolated from the symptoms and identified. Thus the fungi were identified as true pathogens.

RESULTS AND DISCUSSION

Among all the fungal pathogens tested *C. penniseti* found to be highly sensitive to the DMSO extract of *S. anacardium* oil as it has shown higher mycelial inhibition 88.9% and 100% at the 10% and 12% concentrations used in the study. *F. oxysporum* f. sp *ciceris* shown 90% inhibition and *H. maydis* showed 91.1% inhibition at 12% concentration respectively. *C. lunata* has shown 88.9% mycelial inhibition at 12% concentration.

C. lunata seemed to be quite resistant to the extract tested in the study as it has shown 88.9% inhibition which is minimum as compared to the inhibition shown by the other three fungal pathogens at the highest concentration of the DMSO extract used in the study. Mohanta et al., (2007), showed inhibition of *Staphyloccus aureus*, *Shigella flexneri*, *Bacillus licheniformis*, *Vibrio cholerae* and *Pseudomonas aeroginosa* by the different extract of *S.anacardium*. Nair and Bhide, (1996) found bactericidal activity of alcoholic extract of dried nuts of *Semecarpus anacardium* against *E.coli*, *Salmonella typhi*, *Proteus vulgaris*, *Staphylococcus aureus* and *Corynebacterium diphtheriae*.

CONCLUSION

Semecarpus anacardium Linn. oil possessed potential antifungal activity against all the fungal plant pathogens tested in the study.

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Table1: Isolation of the Fungal and Bacterial Plant Pathogens from Their Respective Host Plants

Sr. no.	Host Plant	Disease	Symptoms	Pathogens	Colony Appearance
1	*Pennisetum typhoides* Burm. (Bajra)	Leaf Spot	Small oblong spots on leaves expanding later on to form lesions with central part brown and margin yellow.	*Curvularia penniseti* Boedjin.	Greyish, rough
2	(Maize) *Zea mays* L.	Maydis leaf blight (MLB)	Small yellow dots like spots that becomes brownish to creamy white with red to purple borders. Many spots merge together resulting in blighting of entire leaves.	*Helminthosporium maydis* Nisik & C. Miyake.	Dark green, velvety
3	(Jowar) *Sorghum bicolor* L.	Grain Mold	Black, grey or dark brown, hairy, cotton or cushion like growth on grain	*Curvularia lunata* (Wakker) Boedijn.	Grey to black, smooth
4	(Chickpea) *Cicer arietinum* L.	Wilt	Flaccidity of leaves and dried shoots followed by discoloration and chlorosis of leaf, discoloration also occurs in conducting tissues of stem and root (brown discoloration) leading to complete wilting of the entire plant	*Fusarium oxysporum f. sp. Ciceris* Matuo & K.sato.	Cottony white, dense

Table 2: Antifungal activity of *S. anacardium* oil against *C. penniseti* and *C. lunata*

Plant Species	Treatment Concentrations	Radial Growth of *C.penniseti* (mm)	Inhibition (%)	Radial Growth of *C.lunata* (mm)	Inhibition (%)
S. anacardium **(DMSO extract of Oil)**	1%	56	37.8	50	44.4
	2.5%	46	48.9	35	61.1
	5%	31	65.6	25	72.2
	7%	21	76.7	21	76.7
	10%	10	88.9	15	83.3
	12%	00	100	10	88.3

Table 3: Antifungal activity of *S. anacardium* oil against *H. maydis* and *F. oxysporum* f. sp. *ciceris*

Plant Species	Treatment Concentrations	Radial Growth of *H.maydis*	Inhibition	Radial growth of *F.oxysporum*	Inhibition
S. anacardium **(DMSO extract of Oil)**	1%	65	27.8	31	65.6
	2.5%	49	45.6	25	72.2
	5%	37	58.9	21	76.6
	7%	30	66.7	16	82.2
	10%	11	87.8	13	85.6
	12%	8	91.1	09	90.0

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