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BIO- EFFICACY OF PLANT EXTRACTS AGAINST FUNGAL PATHOGENS OF *BRASSICA CAMPESTRIS* VAR. *SARSON*, *B. JUNCEA* AND *ERUCA SATIVA*

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Extracts of five plants, namely *Azadirachta indica*, *Polyalthia longifolia, Datura stramonium, Lawsania inermis* and *Ocimum sanctum,* found to be inhibitory to fungal pathogens of crucifer oil seeds. *A. indica* was found to be most fungitoxic to most fungi, but *O. sanctum* was proved to be best fungitoxic in case of *Curvularia lunata* and *Penicillium pinophilum.*

Keywords : Bio-efficacy; Botanicals; Plants extracts; Rai; Sarson; Taramira.

Introduction

Brassica campestris var. *sarson*, *B. juncea* and *Eruca sativa,* commonly known as Sarson, Rai and Taramira, respectively, are major oil crops of Western Rajasthan and cultivated as Rabi crops. All these seeds have 30-40% oil and 25-27.05% proteins. These seeds in the field, as well as in storage, get infected by various fungal species[1-3]. *Alernaria* blight caused by *Alternaria brassicae,* is a serious disease and besides this, other fungal forms of pathogenic nature also reduce yield. Fungicidal sprays are generally recommended for the control of these diseases because of lack of resistant varieties. Extensive use of chemical pesticides in agriculture has led to serious environmental problems and development of resistance in pests; therefore, it has become necessary to look for economically better and safer means of disease control.

A large number of plants have been reported to possess fungitoxic properties against plant pathogens[4-5]. Botanicals are in general more compatible with environmental components than the synthetic pesticides, owing primarily due to their susceptibility to degradation by heat, light and micro-organisms. Shivpuri *et al*[6] reported fungitoxic properties of many plant- extracts.

Material and Methods

Preparation of plant extracts for antifungal activity - 25 g of fresh plant leaves were washed 3-4 times with tap water and distilled water, then surface sterilized with 90% alcohol. Subsequently, the plant materials were grounded in 100 ml of distilled water, ethanol, chloroform and petroleum ether separately for aqueous, alcoholic, chloroform and petroleum ether extracts, respectively, but after screening aqueous extract was found to be suitable for all. The macerates were kept for 24 hours at room temperature to evaporate the solvents. The macerates were squeezed through double layered muslin cloth and filtered through filter paper. After filtration, aliquot was centrifuged at 10,000 rpm for 20 minutes. The supernatants were filtered through Whatman No.1 filter paper and then sterilized by passing through 0.2 micron disposable filters. The extracts were diluted to get a concentration of 50mg per ml and were used for *in vitro* studies.

Poisoned food technique - For the evaluation of antifungal effect poisoned food technique was used. The principal involved in this technique was to poison the untrained medium with plant extract and then allowing a test fungus to grow on such a medium. PDA medium was prepared and sterilized. To this medium required quantity of the extract was added to get a certain concentration. This was now thoroughly mixed by stirring and then poured into petriplates and cooled down. Small disc of the fungus culture (10 mm) was cut with a sterile cork borer and transferred aseptically in the center of the pertiplates containing the medium with a certain amount of extract. Suitable checks were kept where the culture discs were grown under same conditions of PDA without extracts. This served as a control. These petriplates were kept in BOD incubator for 72 hours at 27°C. After that the diameter of the fungal colony was measured and compared with that of control.

The bio-efficacy of plant extracts of *Azadirachta indica, Polyalthia longifolia, Datura stramonium, Lawsonia inermis* and *Ocimum sanctum* have been studied.

Table 1. Spermosphere mycoflora of *Brassica campastris, Brassica juncea and Eruca sativa.*

S. No.	Spermosphere Mycoflora	*Brassica juncea*	*Brassica campestris*	*Eruca sativa*
1.	*Alternaria alternata*	+	–	–
2.	*A. brassicae*	+	+	+
3.	*Aspergillus niger*	+	+	+
4.	*A. flavus*	+	+	+
5.	*A. fumigatus*	+	+	+
6.	*Cladosporium cladosporioides*	–	–	+
7.	*Curvularia lunata*	+	+	+
8.	*Drechslera tetramera*	+	+	+
9.	*Fusarium equiseti*	–	–	+
10.	*F. moniliforme*	+	+	+
11.	*Penicilium pinophilum*	+	+	–

Results and Discussion

The results showed that these oil seeds were inhabited by *Alternaria alternata, A. brassicae, Aspergillus niger, A. flavum, A. fumigatus, Cladosporium cladosporioides, Curvularia lunata, Drechslera tetramera, Fusarium equiseti, F. moniliforme and Penicillium pinophilum* (Table 1).

Out of these fungal taxa, *Alternaria brassicae, Aspergillus niger, Curvularia lunata, Fusarium moniliforme and Drechslera tetramera* were pathogenic to all species. Although, *Aspergillus flavus* and *A. fumigatus* were also associated with all three species under investigation, but they do not show pathogenicity.

Different dual plant extracts prepared from leaves and fruit viz. Neem *(Azadirachta indica),* Ashok *(Polyalthia longifolia),* Datura *(Datura stramonium),* Mehandi *(Lawsania inermis)* and Tulsi *(Ocimum Sanctum)* were used to check the growth inhibition of different pathogenic fungi. Control condition was maintained by growing fungal taxa only.

Significant reduction in mycelial growth was reported by all the extracts studied. Maximum inhibition of *Alternaria brassicae, Aspergillus niger, Fusarium moniliforme* and *Drechslera tetramera* have been reported by Neem (*Azadirachta indica*) extract, whereas, Tulsi (*Ocimum sanctum*) showed maximum inhibition against *Curvularia lunata* and *Penicillium pinophilum.* On the other hand, minimum inhibition has been reported by Ashok (*Polyalthia longifolia*) against *Aspergillus niger, Curvularia lunata, Fusarium moniliforme, Drechslera tetramera* and *Penicillium pinophilum.* However, Tulsi (*Ocimum sanctum*) was found to show minimum percentage inhibition against *Alternaria brassicae* (Table 2).

The fungitoxic efficacy of *Allium sativum, Acacia nilotica*[7], *Azadirachta indica*[8], *Eucalyptus globules, Polyalthia longifolia* and *Calotropis procera* [9] and other plants like *Solanum xanthocarpum, Ipomea cornea, Agave Americana, Jatropha curacus* has been studied against *Alternaria brassicae* and *Solanum xanthocarpum,* has been found to be most effective and also effective against *Curvularia lunata* and *Penicillium pinophilum* [10]. Tomar and Chandel [11] found that *Ocimum*

Table 2. Percent inhibition of *Alernaria brassicae, Aspergillus niger, Curvularia lunata, Fusarium moniliforme, Drechslera tetramera* and *Penicillum pinophilum* by different plant extracts.

S. No.	Plant extract	*Alternaria brassicae*		*Aspergillus niger*		*Curvularia lunata*		*Fusarium moniliforme*		*Drechslera tetramera*		*Penicillium pinophilum*	
		Colony diam. (mm)	% inhibition	Colony diam. (mm)	% inhibition	Colony diam. (mm)	% inhibition	Colony diam. (mm)	% inhibition	Colony diam. (mm)	% inhibition	Colony diam. (mm)	% inhibition
1.	*Azadirachta indica* (Neem)	39.1	28.93	75.9	15.66	16.8	26.95	41.5	29.18	32.1	29.60	14.1	29.5
2.	*Polyalthia longifolia* (Ashok)	46.9	14.72	87.9	2.33	20.0	13.04	51.6	11.94	41.6	8.77	19.0	5.00
3.	*Datura stremonium* (Datura)	40.7	26.00	80.1	11.00	17.9	22.17	48.9	16.55	39.4	13.59	18.9	5.50
4.	*Lowsania inermis* (Mehandi)	50.0	9.09	79.5	11.66	18.4	20.00	50.6	13.65	34.7	23.90	18.7	6.50
5.	*Ocimum sanctum* (Tulsi)	52.3	4.95	76.4	15.11	15.1	34.34	46.8	20.47	36.4	20.17	13.5	32.50
6.	Control	55.0	-	90.0	-	23.0	-	58.6	-	45.6	-	20.0	-

sanctum extract provide disease control against *Gladiolies* wilt.

During present studies, another Solanaceous member i.e. *Datura stramonium,* was found efficient to control growth of *Alternaria brassicae* also. It is evident that application of Neem and Tulsi extracts can be used as bio-control agents against diseases of oil seed plants of Brassicaceae.

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