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Evaluation of In Vitro Antifungal Activity of Arid Zone Plants

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Abstract: *Some arid zone plants from Rajasthan state has been tested for their antifungal activity against Fusarium oxysporium, a causal organism of wilt disease in chilli. Root, stem, leaf and flower aque-ous and alcoholic extracts of the plants were tested in vitro against test fungus. Most of the plants were found to have inhibitory effect but better results were reported with Aerva persica, Fagonia cretica and Boerhavia diffusa. Tannin in Aerva persica and flavonoid in Fagonia cretica was also reported..*

Keywords: Plant extracts, antifungal activity, Fusarium oxysporum

I. INTRODUCTION

Wilt of Chilli caused by Fusarium oxysporum, is one of the most important and destructive disease which causes substantial yield losses. In recent years, many phyto-extracts are being used as antifungal and antibacterial agents for the control of various plant as well as human pathogens. Antimicrobial activity of the different plants have been reviewed by many workers (Gehlot and Bohra, 1997, 1998, 1999, Anandaraj and Leela, 1996, Bisht and Khuble, 1995). In modern agriculture dis-eases are controlled by the use of chemicals, however, the indiscriminate use of chemicals is not only hazardous to living beings but adversity effects the microbial population present in the ecosys-tem. To minimize these harmful effects of chemicals on plants as well as on humans a herbal prepa-rations in curing various diseases would be more reliable than that of a chemcial perparations, con-sequently, the percentage of side effects would also be minimum. Considering the medicinal value of plants, the present investigation was carried out in laboratory to study the effect of phyto-extracts of twenty five arid zone plants present in Western Rajasthan, against Fusarium oxysporum, causal organism of wilt disease in chilli.

II. MATERIALS AND METHODS

For the evaluation of antifungal efficacy of various arid zone plants, aqueous and methanol extract of root, stem leaf and flower was prepared. For the preparation of extracts, plant parts were washed 2-3 times with running tap water, sterilized distilled water and finally surface sierilized with 90% alcohol. 5g plant material was grounded in 50 ml of D. W. and methanol for aqueous and alcoholic extracts, respectively and left for 24 h at room temperature. After evaporating the methanol 10 ml D.W. water was added and macerates were squeezed through muslin cloth. Filtrates were centriged at 10,000 r.p.m. for 20 min. The supermantants were filtered through Whatman's no. 1 filter paper and sterilized (by 0.2 µm filters) extracts were used for bioassays.

Antifungal activity of differenet extracts against the test fungus was evaluated by using "Poj soned Food Technique' (Gehlot and Bohra, 1998). Potato dextrose medium was used for the growth of the test fungus. To each 10 ml of culture media, 5ml of plant extract was added and this mixdure was poured into petriplates and agar surface was inoculated with 72h old mycelial disc and incubated at 27 ± 2°C for 72h. After the incubation diameter of fungal colony was measured. Medium devrid of extract was served as control. Three replicates for each extract and control was maintained.

III. RESULTS AND DISCUSSION

Results of this in vitro study are presented in Table 1 Percentage inhibition of the fungi was calculated. It was observed that root, stem, leaf and flower extracts were effective against the fungus. Total inhibition of fungus was observed with both aqueous and alcoholic root extracts of Tribulus terrestris, Boerhavia diffusa and Euphorbia antiquorum while only alcoholic root extracts of Fagonia cretica and Aerva persica showed total inhibition of the fungus. Alcoholic stem

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extracts of Fagonia cretica and Aerva persica showed 100% inhibition of the fungus. Among the leaf extracts, total inhi bition of the fungus was observed with Boerhavia diffusa, Aerva persica and Salsola baryosma aque-ous and alcoholic extracts Only alcoholic leaf extracts of Tribulus terrestris, Fagonia cretica, Balanites aegyptiaca and Salvadora persica were also found to have total inhibitory effect against test fungus. Flower extracts were least effective and alcoholic extract of Boerhavia diffusa, and Sarcostema acidum showed total inhibition.

Table 1 : **Effect of different plant part extracts on the growth of *Fusarium oxysporum*.**

Plant species	Percentage inhibition of the fungus							
	Root extract		Stem extract		Leaf extract		Flower extract	
	Aq.	Alc.	Aq.	Alc.	Aq.	Alc.	Aq.	Alc.
Tribulus terrestris	100	100	75.4	84.2	89.0	100	65.8	69.9
Ocimum americanum	45.1	73.0	74.7	84.9	69.9	72.3	72.3	84.2
Cadaba fruticosa	48.4	52.2	41.2	50.8	68.9	68.9	49.1	49.1
Fagonia cretica	62.7	100	80.9	100	75.4	100	68.9	68.2
Salvadora persica	37.2	38.9	60.3	57.9	49.8	100	49.1	48.4
Tecomella undulata	43.6	46.7	75.4	64.2	62.7	65.1	31.7	30.0
Leptadania pyrotechnica	73.7	74.7	27.1	66.5	83.2	89.0	44.3	48.4
Balanites aegyptiaca	53.9	51.5	52.2	75.4	73.0	100	57.0	57.9
Argemone mexicana	46.7	53.9	73.0	45.1	83.2	74.7	73.0	79.4
Tephrosia purpurea	62.7	63.4	73.0	77.0	65.1	64.2	57.0	18.9
Sarcostema acidum	65.1	66.5	89.0	92.3	*	*	100	100
Barleria acantoides	46.7	53.2	62.0	42.0	68.9	65.8	69.9	36.5
Boerhavia diffusa	100	100	49.9	73.7	100	100	86.6	100
Capparis decidua	5.39	57.9	29.3	55.6	*	*	41.2	40.3
Aerva persica	66.5	100	82.5	100	100	100	53.2	75.4
Ephedra foliata	32.3	38.9	72.3	67.5	*	*	43.6	42.7
Haloxylon recuryum	67.5	69.9	54.1	52.2	53.2	48.0	57.9	62.7
Tamarix aphylla	64.2	61.8	38.9	46.0	67.5	65.1	71.3	73.0
Suaeda fructicosa	58.7	62.7	49.8	46.0	53.9	57.0	64.2	68.2
Salsola baryosma	53.2	58.7	77.0	73.0	100	100	62.7	65.1
Atriplex lentiformis	65.8	69.2	56.3	61.0	49.1	52.2	73.0	72.3
Opuntia dillenii	51.5	57.9	49.1	53.2	*	*	76.1	76.1
Calotropis procera	48.4	38.9	47.4	68.9	43.6	49.1	44.3	53.2
Euphorbia antiquorum	100	100	53.2	63.4	*	*	72.3	65.1
Azadirachta indica	57.9	56.3	42.7	79.4	56.3	57.9	55.6	55.6
S.D.±	4.35	4.48	7.02	5.69	5.33	4.65	5.67	5.97
S.E.	0.87	0.89	1.40	1.13	1.94	1.65	1.13	1.19
Control (medium devoid of extract) =	No inhibition							

* Reduced Leaf. Not tested

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It was observed that all the tested extracts were effective against the test organism, although the degree of inhibition was low. Out of total tested extracts, maximum number of leaf extracts and number of stem extracts showed total inhibition of the fungus.

Root, stem and leaf extract of Fagonia cretica and Aerva persica, root, leaf and flower extracts of Boerhavia diffusa showed total inhibitory effect. Among rest of plants none of one's three plant parts were effective.

These three plant species were selected for preliminary chemical characteristics. Screening of the extracts of these plants for the presence of alkaloids was done with Dragendroff's regent (Harborne, 1973), and only root extracts of Boerhavia diffusa showed presence of alkaloid. The presence of antimicrobial phytochemical flavonoid in Fagonia cretica leves extract and tannin in Aerva persica was observed. The presence of flavonoids have been reported from a number of plant-species such as Prosopis spicigera, Argemone mexicana (Harsh and Nag, 1988). However, the present sutdy deals with the production, isolation and identification of active principles, involved in controlling fungal pathogen.

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