Effect of Different Plant Extracts Against the Structural Pest

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Research Article

Abstract: Fungi are important group of microorganisms that are responsible for various plant and animal diseases .Fungal pathogens like *Fusarium monoliformae, Fusarium solani and Alternaria alternata* are pathogenic to many economically important plants. Chemical fungicides are outstanding in term of efficacy and cost benefit but these chemicals produce the problems of air, soil and water pollutions. Studies on the use of plant extract have opened a new avenue for control of pest. Plant extracts are potential alternative to chemical agents that are hazardous to the environment. In the present paper antifungal activities of leaves of plants like *Ocimum americanum, Boswellia serrata, Gnidia glauca, Woodfordia fructicosa and Mundulea sericea* against *Fusarium monoliformae ,Fusarium solani and Alternaria alternata* were tested. All five plant's leaf extract were found to have inhibitory effect against tested fungal pathogens.

Key words: Antifungal, pathogen, inhibitory.

Introduction

Fungi are a vital group of microorganisms that are responsible for various plant and animal diseases. Major fungal pathogens like *Fusarium moniliforme, Fusarium solani* and *Alternaria alternata* are the structural pest that causes diseases to many economically important plants. A number of chemical fungicides exist in markets, that are outstanding in terms of efficacy and cost benefit. However the indiscriminate use of these chemicals has produced the problems of air, soil and water pollutions. Studies on the use of plant extract have opened a new avenue for the control of pest. Plants extracts are considered as potential alternatives to chemical agents that are hazardous to the environment. Number of plants has been found to possess antifungal properties, which are able to control certain fungal pathogens. Keeping this in view, antifungal effect of some plant extracts need to be determined against *Fusarium moniliforme, Fusarium solani* and *Alternaria alternata*.

Material and Methods

Five plant species (Table 1) were tested in *in vitro* by poisoned food technique to know their inhibitory effect on the growth of *F. solani, F. moniliforme* and *A. alternata.*

Table 1: Plant species used as phyto-extracts for testing efficacy against *Fusarium solani, Alternaria alternata* and *Fusarium moniliforme*

Sr. No.	Plant species	Local name	Plant parts used
1.	*Ocimum americanum*	Ran tulas	Leaf
2.	*Boswellia serrata*	Salai	Leaf
3.	*Gnidia glauca*	Rametha	Leaf
4.	*Woodfordia fruticosa*	Dhayati	Leaf
5.	*Mundulea sericea*	Suphli	Leaf

Isolation, Purification and Maintenance of Pathogens

The pathogens were collected from the infected and diseased vegetables. The above mentioned pathogens were isolated and purified by standard techniques. Petriplates were then incubated at 28^0 C to 30^0 C temperatures to obtain pure fungal pathogens. Purified organisms were taken into stock cultures on agar slants. Periodically the cultures were transferred in fresh cultures tubes and petriplates. During all these operations perfect aseptic conditions were maintained.

Preparation of plant extracts

Healthy fresh plant leaves were taken, washed thoroughly with fresh water and finally rinsed with sterilized distilled water. Fifty grams of plant leaves were cut into small pieces and minced with the help of grinder by adding 50 ml sterilized distilled water. These phyto-extracts were filtered through double-layered muslin cloth in 150 ml conical flasks and plugged with non-absorbent cotton. These filtered extracts were autoclaved at 1.2 kg cm^{-2} pressure for 20 minutes.

Testing of antifungal properties of five plant extracts

Autoclaved extracts were individually added into previously sterilized PDA @ 5 per cent (i.e. 1 ml extract +19 ml PDA plate-^{1}), 10 per cent (i.e. 2 ml extract +18 ml PDA plate-^{1}) and 15 per cent (i.e. 3 ml extract + 17 ml PDA plate^{-1}) and mixed thoroughly at the time of pouring in the previously sterilized petriplates. Petriplates were then inoculated aseptically after solidification by placing 5 mm disc at the center, cut aseptically with cork borer from 10 days old culture of each test pathogen i.e. *F.solani, F.*

moniliforme and *A. alternata* separately. Four repetitions of each treatment for each test pathogen were maintained. The plates without phyto-extracts served as control. Petriplates were then incubated at room temperature (27 ± 28^{0}c).

Observations on colony diameter for each test pathogen were recorded and statistically analyzed and percent growth inhibition was also worked out by using the following formula suggested by Vincent (1947)

$$\text{Per cent growth inhibition} = \frac{C - T \times 100}{C}$$

Results

Attempts has been made to control the pathogens like *Fusarium solani, Fusarium moniliforme* and *Alternaria alternata* through chemical (synthetic) fungicides but these chemical fungicides proved to be uneconomical and hazardous to human beings and animals due to its toxic effects. To avoid the hazardous effects of synthetic fungicides, extracts of *Boswellia serrata, Ocimum americanum* and *Woodfordia fruticosa* can be used as biofungicides without any adverse effect on the environment.

Table 2: Effect of various plant extracts on the growth of *Fusarium solani* in *in vitro* at different concentrations

Name of the Plant Extracts Used	Different concentrations					
	5 % conc.		10 % conc.		15 % conc.	
	Av. colony dia-meter (mm)	Growth inhibition (%)	Av. colony dia-meter (mm)	Growth inhibition (%)	Av. Colony dia-meter (mm)	Growth inhibition (%)
O.americanum (T1)	83.75	5.89	77.25	12.95	71.75	19.83
B. serrata (T2)	70.25	21.06	65.25	26.47	52.00	41.89
G. glauca (T3)	74.00	16.85	70.50	20.56	63.75	28.77
W. fruticosa (T4)	78.25	12.07	70.50	20.56	59.50	33.51
M. sericea (T5)	83.50	6.17	78.75	11.26	70.75	20.94
Control	89.00	-	88.75	-	89.50	-
S. Em. CD at 5% CV	0.48 1.45 1.23		0.54 1.60 1.44		0.50 1.49 1.48	

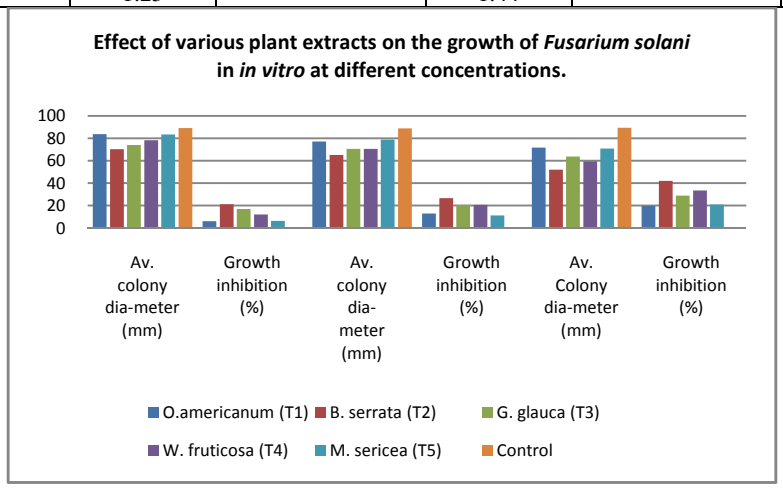


Table 3: Effect of various plant extracts on the growth of *Alternaria alternata* in *in vitro* at various concentrations

Name of Plant Extracts Used	Different concentrations					
	5 % conc.		10 % conc.		15 % conc.	
	Av. colony dia-meter (mm)	Growth inhibition (%)	Av. colony dia-meter (mm)	Growth inhibition (%)	Av. colony dia-meter (mm)	Growth inhibition (%)
O.americanum (T1)	73.00	17.74	68.25	23.31	64.25	27.60
B. serrata (T2)	69.25	21.97	58.75	33.98	50.75	42.81
G. glauca (T3)	78.25	11.83	72.00	19.10	68.25	23.09
W. fruticosa (T4)	75.75	14.64	66.75	25.00	62.00	30.14
M. sericea (T5)	82.75	6.76	73.00	17.97	69.75	21.40
Control	88.75	-	89.00	-	88.75	-
S.Em.	0.54		0.62		0.49	
CD at 5%	1.63		1.86		1.47	
CV	1.41		1.76		1.48	

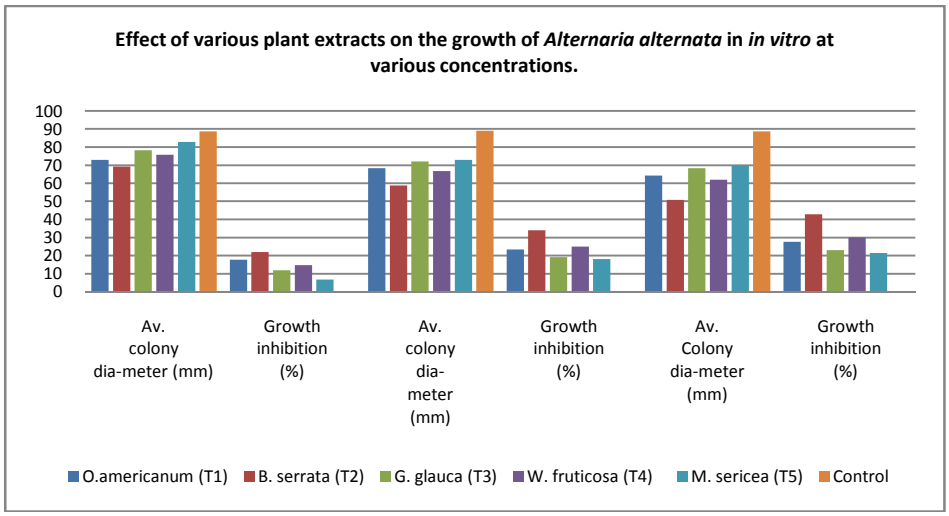
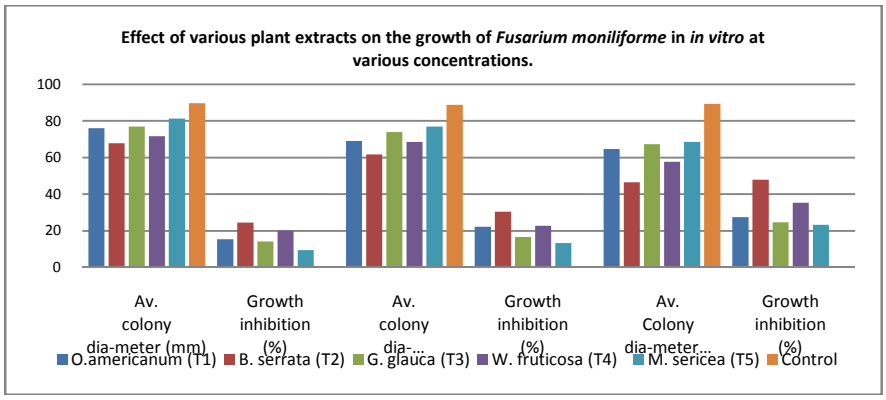
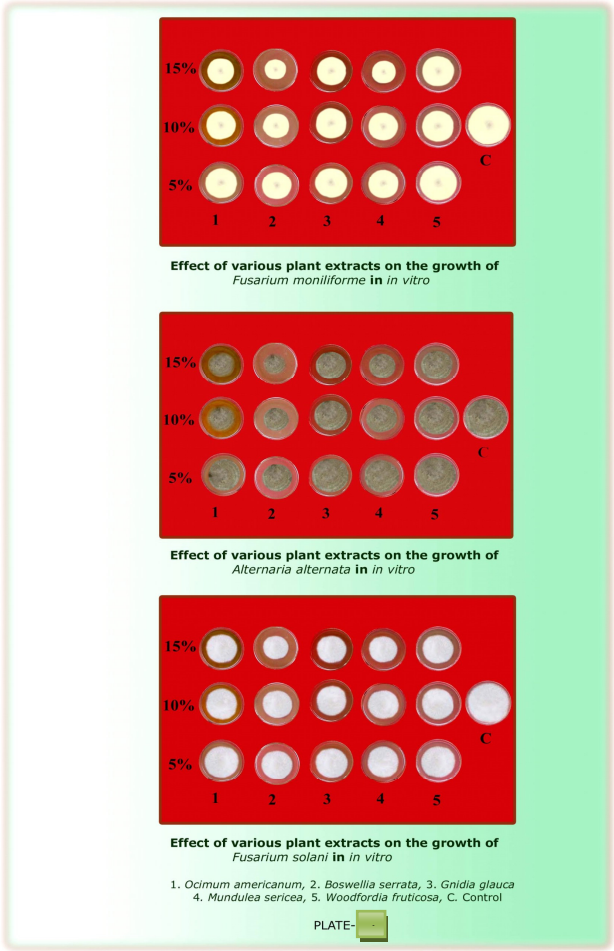


Table 4: Effect of various plant extracts on the growth of *Fusarium moniliforme* in *in vitro* at various concentrations

Name of Plant Extracts Used	Different concentrations					
	5 % conc.		10 % conc.		15 % conc.	
	Av. colony dia-meter (mm)	Growth inhibition (%)	Av. colony dia-meter (mm)	Growth inhibition (%)	Av. colony dia-meter (mm)	Growth inhibition (%)
O.americanum (T1)	76.00	15.32	69.00	22.25	64.75	27.45
B. serrata (T2)	67.75	24.51	61.75	30.42	46.50	47.89
G. glauca (T3)	77.00	14.20	74.00	16.61	67.25	24.64
W. fruticosa (T4)	71.75	20.05	68.50	22.81	57.75	35.29
M. sericea (T5)	81.25	9.47	77.00	13.23	68.50	23.24
Control	89.75	-	88.75	-	89.25	-
S.Em.	0.48		0.47		0.56	
CD at 5%	1.44		1.42		1.67	
CV	1.26		1.31		1.72	



Extracts of *Boswellia serrata, Gnidia glauca, Mundulea sericea, Ocimum americanum* and *Woodfordia fruticosa* with three concentrations *viz*., 5 percent, 10 percent and 15 percent were evaluated in *in vitro* by poisoned food technique for their efficacy against *Fusarium solani, Fusarium moniliforme* and *Alternaria alternata.*



Boswellia serrata and *Woodfordia fruticosa* extracts with three concentrations *viz*., 5 percent, 10 percent and 15 percent were found to be the best in inhibiting the growth of *Fusarium solani, Fusarium moniliforme* and *Alternaria alternata.*

Conclusions

- Results indicated that the extract of *Boswellia serrata* leaves gave maximum inhibition in growth of *Fusarium solani* followed by extract of *Woodfordia fruticosa* and *Gnidia glauca,* while extracts of *Mundulea sericea* and *Ocimum americanum* were found to be ineffective at 5 percent and 10 percent concentrations.
- Results indicated that the extracts of *Boswellia serrata* leaves gave maximum growth inhibition of *Alternaria alternata* followed by extract of *Woodfordia fruticosa* and *Ocimum sanctum* while extract of *Gnidia glauca* and *Mundulea sericea* were ineffective at 5 percent and 10 percent concentrations.
- Results indicates that the extracts of *Boswellia serrata* leaves gave maximum growth inhibition of *Fusarium moniliforme* followed by extract of *Woodfordia fruticosa* and *Ocimum americanum* while extract of *Gnidia glauca* and *Mundulea sericea* were ineffective at 5 percent and 10 percent concentrations.

From the results it is proved that out of five plant species tested, *Boswellia serrata, Ocimum americanum* and *Woodfordia fruticosa* can be used as biofungicides for controlling the plant diseases. These biofungicides are ecofriendly and non hazardous to animals and humans. Garg (1974) reported the antifungal activity of *Boswellia serrata* against *Fusarium monoliforme.* Anwar *et al.,* (1994) reported the antifungal activity of *Ocimum basilicum* and *Ocimum canum* against *Alternaria alternata, Curvularia lunata* and *Fusarium equisetii.* Chaudhary *et al.,* (1995) reported the antifungal activity of oil from *Ocimum canum* against *Fusarium monoliforme.* Rawal and Thakore (2003) reported the inhibitory effect of *Ocimum sanctum* on *Fusarium solani* causing Fusarium rot of sponge gourd (*Luffa cylindrica*). The present results are in line of these views.

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