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EFFICACY OF PLANT EXTRACTS AGAINST *FUSARIUM OXYSPORUM* f. Sp. *LENTIS* ON *LENS ESCULENTA*

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Leaf extracts of different higher plants showed absolute toxicity inhibiting the mycelial growth of the test pathogen. The concentration, temperature, pH, storage showed various effects, the results are discussed in the light of experiments done.

Key Words : Extract, Efficacy, *Fusarium oxysporum, Artabotrys hexapetalous, Lens esculenta*

The application of extracts of green plants for the control of diseases caused by various fungi had been reported earlier (Gilliver, 1947; Dixit *et al.*, 1978; Tripathi *et al.*, 1982; Mishra *et al.*, 1988; Tiwari *et al.*, 1990). In present investigation, leaf extract of various higher plants were screened for their fungitoxicity against *Fusarium oxysporum* f. sp. *lentis* Schl. , the causal organism of wilt disease in *Lens esculenta* (Lentil). various fungitoxic properties of the extract of *Artabotrys hexapetalous* were determined. The effect of increased inoculum and some physical factors viz., autoclaving, temperature and storage was also studied.

MATERIALS AND METHODS

Fresh leaves of different plant collected locally were washed with 70% ethanol. Again the leaves were washed repeatedly with fresh water and finally with sterilized water in order to remove the traces of ethanol. These leaves were pulverised well and strained through two layers of sterilized cheese cloth and finally the filtrate was centrifuged at about 5000 rpm for five minutes. The extracts thus prepared were tested separately for their fungitoxicity against *F. oxysporum* f. sp. *lentis* by poisoned food technique of Grover and Moore (1962). The M.D.A.I. (Maximum Dilution for Absolute Inhibition) of the leaf extract of *A. hexapetalous* against the test pathogen was determined by usual poisoned food technique. The fungistatic/ fungicidal nature of the extract was evaluated by the method described by Garber and Houston (1959). The fungitoxic spectrum of the extract against 20 fungi and the effect of increased inoculum on the toxicity of the extract were studied by poisoned food technique. Besides, the effect of some physical factors viz., autoclaving, temperature and storage on the activity of the extract was studied by usual poisoned food technique. The fungitoxicity was calculated following Dixit *et al.* (1978) and recorded in terms of percentage of mycelial inhibition. Each experiment was repeated twice and contained three replicates.

Table 1: Screening of leaf extracts against *F. oxysporum* f. sp. *lentis*

Plant sp.	Percentage mycelial inhibition
Aegle marmelos (L.) corr.	90.20
Artabotrys hexapetalous (L.) Bhandari	100.00
Brassica rapa L.	17.06
Bryophyllum pinnatum (Lam.) kurtz	16.60
Calotropis procera (L.) R. Br.	84.40
Cassia tora L.	85.70
Celosia cristata L.	46.24
Cleome gynandra L.	90.00
Croton ruxburghii Bal.	95.24
Cycas revoluta Thunb.	79.30
Delonix regia (Proj.) Orteg.	38.20
Euphorbia geniculata Orteg.	38.20
Erythrina indica Lamk.	77.70
Ficus glomerata L.	54.24
Ginkgo biloba L.	71.10
Helianthus annus L.	68.90
Ixora chinensis L.	79.83
Jatropa gossypifolia L.	28.57
Launea asplenifolia (Willd.) Hook. f.	75.20
Moringa oleifera Lamk.	52.10
Mallotus phillipinensis Lamk.	10.10
Oxalis corniculata L.	26.32
Physalis peruviana L.	90.00
Spinacea oleracea L.	21.56
Trama orientalis (L.) Blume	54.24

RESULTS AND DISCUSSION

During screening of leaf extracts of higher plants, the extract of *A. hexapetalous* exhibited absolute toxicity inhibiting the mycelial growth of the test pathogen completely. The leaf extracts of *Aegle*

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Table 2: Maximum Dilution for Absolute Inhibition (MDAI) of the leaf extract of *A. hexapetalous* against *F. oxysporum* f. sp. *lentis*

Different dilutions of leaf extract	percentage mycelial inhibition
1:1	100**
1:10	100**
1:20	100**
1:40	100**
1:60	100**
1:80	100**
1:90	98.20*
1:100	92.00*

** fungicidal
* fungistatic

Table 3: Fungitoxic spectrum of the leaf extraxt of *A. hexapetalous*

Fungal species	Percentage mycelial inhibition at M.D.A.I. of leaf extract
Absidia spinosa Lendar	100
Achlaya crenulata Ziegler	100
Alternaria alternata (Fr.) Keissler	100
Aspergillus flavus Link ex Fr.	56.20
A. japonicus Saito	100
A. niger Van Teigh	74.20
A. tamerii Kita	52.00
A. terreus Thom	100
Chaetomium globosum Kunje ex	100
Curvularia ovoidea (Hiroe & Watanase) Muntanjole	100
C. pallescens Boedijn	100
Fusarium moniliforme Sheldon	100
F. nivale Ces	76.70
F. oxysporum Schi.	100
Gymnoacus sp. Baron	100
Nigrospora oryzae Mason	100
Penicillium chrysogenum Thom	90.10
P. funiculosum Thom	100
Sepedonium sp. Link ex.fr.	100
Trichoderma viridi Pers ex.fr.	96.00

Table 4: Effect of increase of inoculum on the fugitoxicity of leaf extract of *A. hexapetalous*

Parameter		Percentage mycelial inhibition *F. oxysporum* f.sp. *Lentis*
Increase of inoculum (No. of disc of 5 mm diameter)	2	100
	4	100
	6	100
	8	100
	10	100
	12	100
Increase of inoculum (Diameter of disc in mm)	5	100
	10	100
	15	100
	20	100
	25	100

Table 5: Effect of some physical factors on the fungitoxicity of leaf extract of *A. hexapetalous*

Parameters		Percentage mycelial inhibition *F. oxysporum* f. sp. *lentis*
Effect of storage temp. (30±2) °C	1 day	100
	5 days	100
	10 days	100
	15 days	100
	25 days	100
Effect of temp. (°C)	40	100
	60	100
	80	100
	100	100
Effect of autoclaving (at 15 lb/ sq inch pressure for 20 minutes)		100

marmelos, Cleome gynandra, Croton ruxburghii and physalis peruviana also showed strong toxicity (Table 1). The leaf extract of *A. hexapetalous* was fungicidal at its M.D.A.I. of 1:80 (w/v) against the test pathogen (Table 2). The extract inhibited the mycelial growth of 14 fungi completely out of 20 fungi tested at M.D.A.I. (Table 3). The increase in inoculum had no adverse effect on activity of the leaf extract (Table 4). The temperature (40-100°C) treatment and autoclaving had no adverse effect on the fungitoxicity of the extract. Further, the extract exhibited absolute activity up to 25 days when stored at room temperature (Table 5).

A large number of plant from Gorakhpur and the neighbour localities have been screened for their fungitoxicity against different fungi (Pandey *et al.*, 1981; Dubey *et al.*, 1984; Mishra *et al.*, 1988 but the activity of these plants against *Fusarium oxysporum* f. sp. *lentis* causing wilt of *Lens esculenta* (Lentil) was neglected so far. In present investigation *A. hexapetalous* showed absolute toxicity against *F. oxysporum* f.sp. *lentis*. Chandra *et al.* (1981) reported it to be inactive against *Helminthosporium oryzae* while later on Graigne and Alvarer (1987) reported it to be active against *Dreschslera oryzae (H. oryzae)*. Further Kishore *et al.* (1982) reported it to be inactive against *Fusarium moniliforme* and active against *Colletotrichum fulcatum* and *Rhizoctoina solani*. The extract also showed absolute toxicity against *F. moniliforme* in present investigation.

Thus the extract of *A. hexapetalous* due to its

strong fungitoxicity, broad range of activity, thermostability and persistence of activity during storage may prove useful for the control of *F. oxysporum* f. sp. *lentis* causing wilt disease in *Lens esculenta.* Further *in-vivo* investigations with active plant are in progress at the laboratory.

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