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ANTIFUNGAL ACTIVITY OF VARIOUS PLANT EXTRACTS/PRODUCTS ON *Exserohilum turcicum* (Pass.) Leonard

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ABSTRACT

Eleven plant products belonging to Liliaceae, Meliaceae, Verbenaceae, Labiatae, Chenopodiaceae, Euphorbiaceae, Leguminosae and Poaceae were screened for antifungal properties against *Exserohilum turcicum*. The plant products/extracts *viz.*, Alitin (commercial), *Allium sativum* (bulb extract), *Lantana camera* (leaf extract), *Azadirachta indica* (seed extract) and *A. indica* (commercial oil) were highly inhibitory to spore germination and mycelial growth of the pathogen *in vitro*. None of these plant products/extracts were promising when tested *in vivo*.

KEY WORDS : Leaf blight, Plant products, Antifungal activity

Leaf blight of *Sorghum biocolor* (L.) Moench incited by *Exserohilum turcicum* (Pass.) Leonard is quite widespread and destructive disease in Tamil Nadu. Under favourable environmental conditions upto 27.5 per cent yield loss was estimated on the highly susceptible cultivar K 4. Studies on the control of leaf blight have indicated that it could be effectively controlled by various common fungicides (Alexander, 1960; Shanmugam *et al.*, 1966 ; Arjunan, 1970). With the increase in awareness towards toxic hazards of fungicides to crops, consumers and environment due to their phytotoxic, residual and pollution effects the importance of indigenous products in plants disease control has been emphasised (Fawcett *et al.*, 1969 ; Jaganathan, 1984). With the object of identifying the plant for their antifungal activity, various commonly available plants were selected for the present study. Poisoned food technique (Grover and Moore, 1962) was mainly used for *in vitro* assay of plant materials against *Exserohilum turcicum*. Attempt was also made to find out whether the results could be applied for use in field crops.

MATERIALS AND METHODS

In vitro evaluation

Eleven plant products/extracts *viz.*, Alitin (synthetic) (0.1%), bulb extract of *Allium sativum* L. (1%), seed oil of *Azadirachta indica* Juss (1%), leaf extracts (10%) of *Lantana camera* L., *Mentha viridis* L., *Basala rubra* L., Leucaena leucocephala Benth, *Sorghum bicolor* (L.) Moench and *Pedilanthus podifolius* Point, bulb extract of *Allium cepa* L. (1%) were screened for their antifungal properties.

Inhibition of spore germination

To study the effect of various plant extracts/products on spore germination, the extracts were prepared by cold water extract method (Shekhawat and Prasada, 1971). One g of plant material was washed and ground with a pestle and mortar in one ml of distilled water and filtered through cotton wool. The filtrate was diluted with sterile distilled water to get desired concentrations. These extracts were used for spore germination.

Spores of *E. turcicum* were collected by flooding with sterile distilled water. The spore suspension was filtered through a muslin cloth to remove mycelial fragments. One drop of

Table. Effect of plant products on *E. turcicum*

Plant Products	Mean disease index			
	Spore germination (%)	Mean mycelial growth (mm)	Spray after inoculation (PDI)	Spray before inoculation (PDI)
Alitin (synthetic product) 0.1%	0.0	6.6	55.9	40.5
Allium sativum (bulb) 1%	9.2	12.4	60.5	41.4
Azadirachta indica (commercial oil) 1%	20.5	39.0	52.2	40.9
A. indica (kernel) 1%	22.5	45.1	54.6	45.0
Lantana camera (leaf) 10%	9.3	11.4	64.5	45.5
Mentha viridis (leaf) 10%	52.3	30.4	58.3	40.3
Basala rubra (leaf) 10%	55.3	47.0	55.2	44.6
Pedilanthus podifolius (leaf) 10%	60.1	38.2	64.8	43.5
Allium cepa (bulb) 1%	49.4	41.0	54.7	40.2
Leucaena leucocephala (leaf) 10%	55.4	44.9	60.5	41.9
Sorghum bicolor (K5 leaf) 10%	10.5	15.0	64.9	45.0
Control (Sterile water)	98.5	90.0	65.2	45.5
Mancozeb 0.2%	8.4	4.0	26.8	11.8
C.D. (P = 0.05)	8.9	11.45	14.56	6.31

cold extracts of the plant material was added to the cavity slide separately and allowed to evaporate. A drop of the spore suspension (10^5 spores/ml) was added to the dried extract and incubated at 30°C. Four replications were maintained and the percentage of spore germination recorded after 72 hr. These treatments were compared with fungicide mancozeb (0.2%). Slide with water alone served as control.

Mycelial inhibition studies

The effect of various plant products/extracts on radial growth (mycelial) of the fungus was tested by poisoned food technique (Grover and Moore, 1962). Fifteen ml of boiled water extract of the plant material at desired concentration was incorporated into sterilised oat dextrose agar in sterile petri plates. The extraction was done in boiled (70°C) distilled water. Uniform discs of 5 mm size from seven days old culture, *E. turcicum*, grown on oat dextrose agar were inoculated in the centre of the disc and the plates were incubated at room temperature. These treatments were compared with oat agar amended with mancozeb (0.2%). Each treatment was replicated four times. The mean radial growth of the fungus was recorded after 72 hr of incubation under laboratory condition (30 ± 2°C).

Field evaluation

Sorghum (K 4) seeds were sown in one cent plot with a spacing of 45 x 15 cm during second week of October 1985. Eleven different plant products/extracts, a fungicide and control were included as treatments which were randomised and replicated four times.

In one set of experiment spore suspension of the pathogen (10^5/ml) was spray inoculated on 30 days old crop. The plant extracts and fungicide were sprayed 48 hr after the inoculation of the pathogen. In another set of experiment, extracts and fungicide were sprayed first, followed by spraying of spore suspension after three hr. The disease intensity

was assessed 20 days after inoculation by adopting standard scale 1-5 (Anon., 1978).

RESULTS AND DISCUSSION

The studies clearly indicated that plant products *viz.*, Alitin (commercial), bulb extract of *Allium sativum*, leaf extracts of *Lantana camera* and *Sorghum bicolor* (K 5 variety) were highly inhibitory to spore germination and mycelial growth of *E. turcicum in vitro*. Seed extract and seed oil of *Azadirachata indica* were the next best treatments (Table). The inhibitory action might be due to the sulphur containing compounds like allicin, alyl propyl disulphide, diallyl disulphide etc. in *Allium sativum*, the bitter principle "Nimbidin" which is also a sulphur containing compound in *Azadirachta indica* (Anon., 1948). Further studies are necessary to identify the antifungal principle. However, when these plant extracts/products were tested in the field conditions, mancozeb treatment only recorded minimum intensity while the plant products were not effective. This might be due to the quick degradation of plant products under tropical temperature.

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EFFECT OF INTERCROPPING OF PULSES IN CEREALS ON THE INCIDENCE OF MAJOR PESTS

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ABSTRACT

Effect of intercropping of greengram, cowpea, blackgram and soybean in maize and sorghum on the incidence of stem fly, whitefly, yellow mosaic and pod borer of pulses and shoot fly and stem borer of cereals indicated no significant effect on the pests except stem fly in blackgram, whitefly in cowpea, yellow mosaic and pod borers in green gram. Stem fly in blackgram and whitefly in cowpea were high when intercropped with maize. Greengram had low incidence of yellow mosaic when intercropped with maize and sorghum than raised as pure crop. Pod borer damage in greengram was significantly lesser in pure crop than raised with maize and sorghum. There was no difference in shoot fly and stem borer of sorghum and maize between pure crop and mixed with intercrops.