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Evaluation of some plant extracts for biological control of common parasites of cash crops in Hooghly district of West Bengal

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In the present investigation twentyfive angiosperms and two pteridophytes were screened for antifungal activities against seven phytopathogenic fungi. The ethanolic extract of all the plants was found to have antifungal activities against several fungi tested except *S. nigrum* where petrolium benzene extract wes found to exhibit the antifungal activity. It was also observed that different solvent extracts exhibited wide variation in their antifungal activities.

Key words : Angioserms, pteridophyte, phytopathogens, antifungal activity

The present paper deals with the exploitation of common weeds of different agricultural belts of Hooghly district in view of formulation and development of phytopesticides for disease management programme which is likely to be acceptable as economically eco-friendly technology. Screening of plant extracts for antimicrobial activity has been carried out by several authors (Osbern, 1943 ; Atkinson *et al.,* 1946 ; Dhar *et al.,* 1968 ; Berdy, 1980 ; Nagvi *et al.,* 1991 ; Tayor *et al.,* 1995). Some excellent information regarding the potentiality of angiospermic plants in controlling of fungi have been published. We have a vast number of medicinal plants and weeds in the state of West Bengal but very few of them are scientifically studied as a controlling agents. In West Bengal such screening work has been done by Gupta and Banerjee (1972) and Roy and Mujumder (1976). In the present experiments 25 angiosperms and 2 common ferns distributed in the different areas of Hooghly district are screened for their antimicrobial activities.

Plants were collected from different localities of Hooghly district. After identification, the different plant parts were separated and then washed separately in tap water followed by rinsing in sterile distilled water and then dried at 40°C in an oven for 3-4 days. After completion of drying it was then ground in a mixture grinder to make dry power. The dried specimens (powder) were stored in air tight plastic tube in desicator until further use.

An aliquot of 10 g of dried powder specimens was weighed carefully and then extracted in Soxhlet apparatus with four different organic solvents (160 ml each), namely ethanol, petroleum ether, petroleum benzene and chloroform. Solvent extractions, were carried out repeatedly in the apparatus at 60°C—70°C until the extracts became colourless. The individual crude extracts were pooled together and concentrated to 20-25 ml by volume in rotaevaporator at 40°C. It was then poured in a clean sterilized 50 ml conical flask covered by aluminium foil tightly to avoid evaporation and then stored at 4°C under refrigeration for further use.

The test organisms (fungi) were isolated from infected crop plants collected from different localities of Hooghly districts and was identified after consulation with literature (Bilgrami *et al.,* 1991 ; Ellis, 1971, 1976 ; Chupp, 1953 ; Mukherjee and Bhasin, 1986 ; Agrios, 1997 ; Deighton, 1976.) The test organisms were grown in respective culture media.

Assay of plant extracts were done by paper disc-plate diffusion method following standard technique. Plates were prepared with the proper concen-

tration of inocula of the test fungi. Sterile 5-10 mm Whatman No. 1 filter paper discs were aseptically soaked separately with crude extracts (petroleum ether, chloroform, ethanol and petroleum benzene) of different plants and after drying, placed in the seeded agar plate. The plates were then incubated at 28°C-30°C for 24-96 hrs and diameter of inhibition zone was measured from the edge of the disc to the inner margin of the surrounding pathogens. All these bioassay experiments were carried out under sterile condition.

Table 1 : Screening of antifungal activity of crude extracts of plants obtained by different solvents.

Plants	Solvents Used for extraction	Parts	Organisms						
			Ab	Aa	At	Rs	Cg	Fo	Cl
Datura metel	E & PB	L	+++					+++	-
Nicotiana tabacum	E	L	++					++	
	PB	L	+++					+++	
Ocimum sanctum	E	L	++				+	++	
Withania somnifera	E	L	+						
Mentha piperita	E	L	+				-	-	
Leucas aspera	E	L	+				-	-	
Solanum nigrum	PB	L	-				-	-	
Leonurus sibiricus	E	L	-				-	-	
Oryza officinalis	E	L		-					+
Azadirachta indica	E	L		+					-
Mentha arvensis	E	L		-					-
Urtica dioica	E	L		++					-
Adhatoda vasica	E	L	+++		+++	+++			
Brassica campestris	E	L		+					+
Rumex maritimus	E	L	++				+++	++	
Polygonum orientale	E	L	+				++	+	
P. hydropiper	E	L	+				+		
Antigonon leptopus	E	L	+				+		
Allium sativum	E	Bulb						+++	
Vitex negundo	PE	L	+++		+++	+++			
Lantana camara	E	L				+			
Clerodendron infortunatum	PE	L	+++		++	++			
Cestrum nocturnum	E	L	+++		++	+++			
Mimosa pudica	E	L						++	-
Centella asiatica	E	L	+++		++	+++			
Microsorum punctatum	PE	L				+++			
	CL	L	+++		+++				
Dryopteris filix mas	E	L	++	+	+++				

E = Ethanol, PE = Petroleum ether, PB = Petroleum benzene, CL = Chloroform, L = Leaf, +++ = Highly potent, ++ = Medium potency, + = Low potency, - = Nil potency, Gap = Not performed

Ab = *Alternaria brassicae*, Aa = *Alternaria alternata*, At = *A. tenuissima*, Rs = *Rhizoctonia solani*, Cg = *Colletotrichum gloeosporioides* Fo = *Fusarium oxysporum* Cl = *Curvularia lunata*

Among fungi *Alternaria brassicae* showed sensitivity against ethanolic extracts of *Datura metel, Adhatoda vasica, Vitex negundo, Cestrum nocturnum, Centella asiatica ;* and petroleum benzene extracts of *Nicotiana tabacum* and chloroform extracts of *Microsorum punctatum.*

Alternaria tenuissima was highly sensitive to *Vitex negundo, Adhatoda vasica, Microsorum punctatum* and *Dryopteris filix mas.*

Rhizoctonia solani responded well against ethanolic extracts of *V. negundo, A. vasica, C. nocturnum, C. asiatica* and *M. punctatum.*

Ethanol extracts of *Rumex maritimus* showed remarkable inhibition of *Colletotrichum gloeosporoides.* Petroleum benzene extracts of *D. metel,* and *N. tabacum* and ethanolic extracts of *Allium sativum* showed promising effect against *Fusarium oxysporum.*

The present study being a screening programme, employed only *in vitro* studies. Further investigation is necessary regarding isolation, purification and characterization of bioactive principles of the screened plants by sophesticated techniques.

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