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In vitro Antifungal Activity of *Plagiochasma appendiculatum* Against *Alternaria solani*

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In vitro **study to screen the antifungal activity of liverwort *Plagiochasma appendiculatum* against *Alternaria solani* was conducted by using different concentrations of crude aqueous extract. Results based on colony diameter and fresh weight revealed that lower concentrations of plant extract were less effective but higher concentrations were found to be much potent in inhibiting fungal growth both vegetative and reproductive phase.**

Key words: *Plagiochasma appendiculatum, Alternaria solani,* Antifungal activity.

The most infectious diseases are microbial in origin. As resistant strains of pathogens are increasing every passing day, demand of natural antimicrobial therapeutics is rising correspondingly. In search of herbal antibiotic substances, bryophytes, the earliest land plants are proved to possess tremendous potential against pathogenic organisms.

This group of plants is now well known for their isoflavanoides, flavanoides, biflavanoides, terpenoides and phenolic compounds, responsible for their antimicrobial properties.

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Pallavicinia lyellii, a liverwort, showed activity against four pathogenic fungi namely *A. niger, A. fumigates, F. oxysporum* and *C. albicans* (Subhisha *et al.,* 2005). Acetonic and methanolic extracts of *Palustriella comutata* (Hedw.) were tested against II bacteria, 1 yeast and 8 moulds while proved inactive for yeast and mould, the extracts were proved to be effective against bacteria (Ilhan *et al.,* 2006). Deora *et al.,* 2007 studied three bryophytes *Plagiochasma articulalum* (Kash), *Anthoceros longii* (Steph), *Fissidens bryoides;* liverwort, hornwort and moss respectively for their antibiotic effect on *Agrobacterium tumi/acians.* The results showed that mosses are highly antibiotic in nature followed by hornworts and liverworts. Some of the bryophytes eg. *Lunularia cruciata* have antioxidant property (Umachigi & Kumar, 2007). An antifungal dibenzofuran bis (bienzyl)s in *Asterella angusta* was found to be responsible for its fungal inhibition property (Qu & Xie, 2007). This liverwort was tested for antibacterial activity using *E. coli, Pseudomonas aeruginosa, Bacillus*

subtilis and *Staphylococcus* aureus and extracts were found to inhibit bacterial growth significantly. In present study *Plagiochasma appendiculatum* was tested against inhibition of *Alternaria solani*. It was observed that the antifungal chemical is quite effective for the fungus studied.

MATERIAL AND METHODS.

Thalli of *Plagiochasma appendiculatum* in vegetative as well as sporophytic stages were collected from Mount-Abu, Dist Sirohi (Rajasthan) in rainy season from walls of Achlesh war Temple and Near Nakki-lake. The collected material was washed thoroughly to remove soil and other particles.

It was then pressed between filter papers to remove excess water. Fresh weight was taken and then kept in refrigerator till extracts formation. An equal amount of double distilled water was added in the plant material and grinded to form a fine paste using a mixture grinder and left overnight so that all water soluble substances get dissolved in water. It was then filtered through a sieve. It was centrifuged at 6000 rpm for 20 minutes. The supernatant was filtered using Whatman filter paper no. 1. The crude extract was serially diluted using double distilled water, to form extract of different concentrations from 10-100 per cent. All extract solutions were autoclaved and stored in Refrigerator

The parameters, colony diameter and colony fresh weight were studied to determine the effect of extract using pour plate method.

All the experiments were set in completely aseptic condition on laminar air flow bench. Three replicates for each extract concentration were set. PDA and extract (1:1) poured in pre sterilized petri dishes were used to inoculate fungal colonies of 5 mm diameter, at centre of each petri plate with the help of cork borer. The control was also established using medium exclusively, the petri dishes were then kept at room Temperature for 3 days. Data of colony diameter and weight were recorded on 4th day after innoculation.

RESULTS AND DISCUSSION

The mean values of colony diameter and colony fresh weight for different extract concentrations are given in the table 1. Results showed that maximum colony diameter was 64 mm. recorded in the control, followed by 47 mm in 10 percent aqueous crude extract.

Minimum colony diameter was 7 mm recorded in 100 per cent extract concentration. Similarly fresh weight was maximum 950 mg in the control 680 mg in 10 per cent extract concentration and it was minimum 210 mg in 100 per cent extract concentration.

A comparative study of colony diameters and colony fresh weight in different

Table 1. Effect of *Plagiochasma appendiculatum* aqueous crude extract on colony diameter and colony fresh weight of *Alternaria solani.*

S. No.	Extract Solution (Per cent)	Mean colonydiameter (m. m)	Fresh wt of colony(mg)
I	CONTROL	64 mm	950 mg
2	10	47 mm	680 mg
3	20	38 mm	602 mg
4	30	32 mm	586 mg
5	40	26 mm	526 mg
6	50	23 mm	518 mg
7	60	17 mm	480 mg
8	70	16 mm	460 mg
9	100	7 mm	210 mg

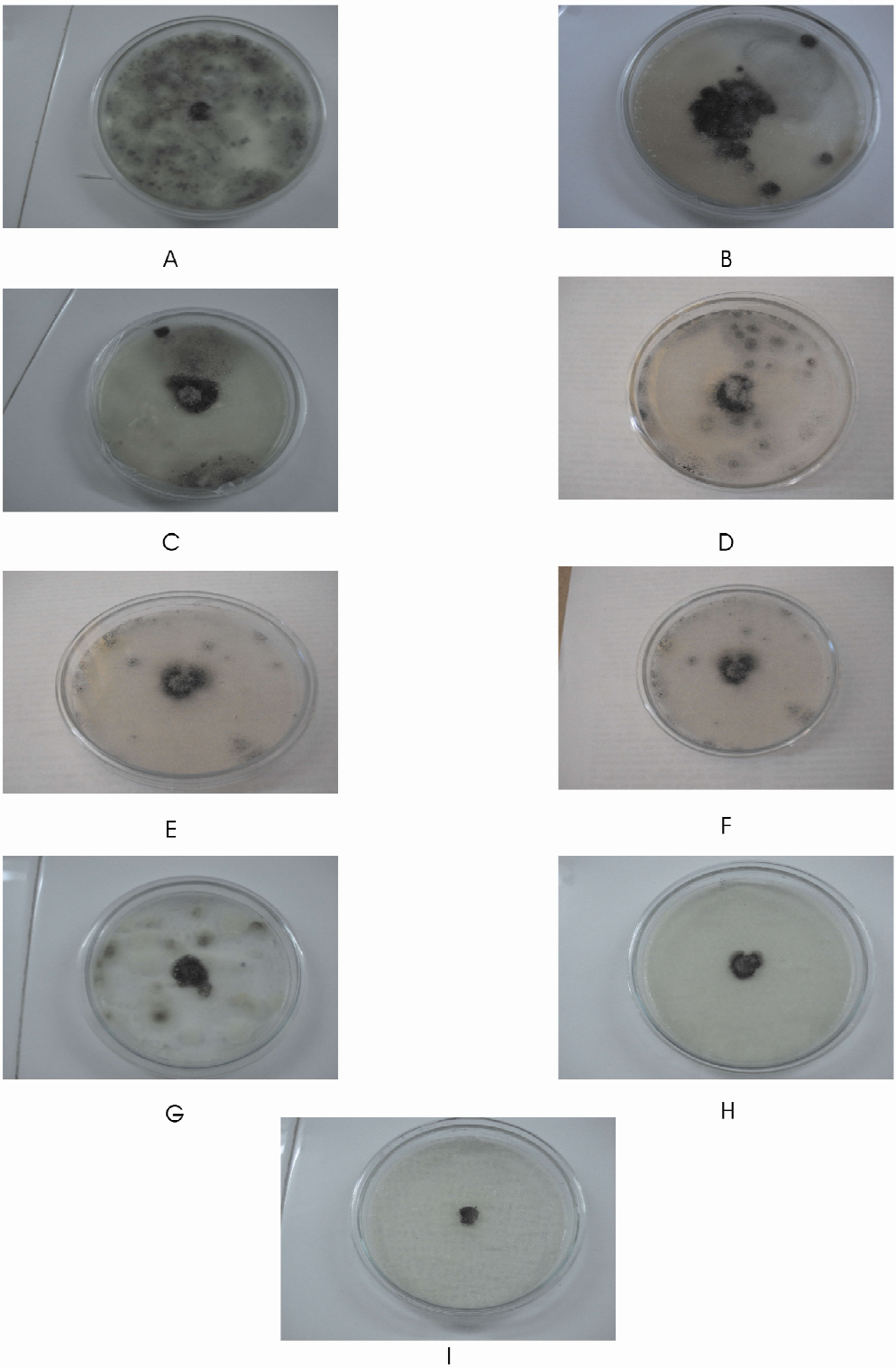

Fig. 1. Effect of different concentrations of crude extract of *Plagiochasma appendiculatum* against *Alternaria solani* A-Control, B-10%, C-20%, D-30%, E-40%, F-50, G-60%, H-70%, I-100%

concentrations showed that lower concentrations were less toxic but higher concentrations showed significant toxicity against fungal growth. Both hyphal growth and conidial development were suppressed by concentrated extracts resulting in decreased colony diameter and fresh weight.

All earlier investigators found similar results and suggested that some metabolites present in bryophytes which are responsible for antimicrobial effects while Pallavicinia lyellii was proved effective against a number of fungi (Subhisha & Monism, 2005), *Palustriella coinutata* was effective against many gram positive and gram negative bacteria (I I han S. Savaroglu, 2006). *C. conicum* and *Dumortiera hirtuta* were found to inhibit *Candida albicans* while *Sphagnum* sps. inhibited *Staphylococcus aureus* and *Pseudomonas aereginiosa* (Deora & Bhati; 2007).

Based on the available literature and the results of this experiment it is clear that aqueous crude extract of *Plagiochasma appendiculatum* has powerful antifungal properties. The plant might prove useful for development of novel antifungal drugs.

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