

## Screening of antimicrobial activities of three lichens

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Antimicrobial activities of the three lichens (*Physcia* sp., *Cladonia* sp. and *Lecanora* sp.) were tested against eight fungal and two bacterial pathogens and found to be highly promising bio-controlling as well as anti carcinogenic agents.

**Key words :** Antibacterial, antifungal, Lichen

### INTRODUCTION

Wide varieties of diseases and their causal agents in various bio-geographical regions across the globe developed slowly but inevitably regulated the destiny of human races from time to time. In most of these cases, huge varieties of synthetic chemicals i.e. bactericides, fungicides, pesticides and antibiotics are used as chemotherapeutic agents. But indiscriminate uses of these products pose a great threat in giving rise to resistant strains of pathogens, lyses of beneficial organisms and various environmental hazards. So with the great progress in biotechnological research for safer, eco-friendly biological control measures facilitates to improvise the niche. Thus plant source has been one of the major weapons in control of such diseases. Screening and reviewing of plant extracts for their antimicrobial activities have extensively been carried out by several scientists (Osborn, 1943; Gupta and Paul, 1995 ; Kurucheve *et al.*, 1997 ; Ahmad *et al.*, 1998 ; Ganesan *et al.*, 2004; Sengupta *et al.*, 2004 and 2008; Tripathi, 2005; Yadav and Thrimurthy, 2005; Sharma *et al.*, 2006; Bohra *et al.*, 2006 ; Sharma *et al.*, 2006 ). Lichens are known as the pioneers of plant world and many lichen species have substances with antimicrobial properties. In the present investigation, an attempt has been made to screen some lichens for their antibiotic properties.

### MATERIALS AND METHODS

Thallus of the lichens (*Physcia* sp., *Cladonia* sp. and *Lecanora* sp.) were collected during the month

of November , 2006 and after bringing them in the laboratory they were properly cleaned, dried (oven dried at 40°C), dusted and stored in dessicator. The ethanolic extracts were prepared separately in soxhlet apparatus (g/10 ml) and each was concentrated (1/5<sup>th</sup> of its volume )in rotaevaporator. The pH of the extracts was noted down. The antifungal activities of these extracts were tested against *Aspergillus niger*, *Aspergillus flavus*, *Alternaria brassicicola*, *Colletotrichum capsici*, *Curvularia lunata* , *Fusarium udum*, *Penicillium expansum* and *Rhizopus stolonifer* and antibacterial activities against *Bacillus cereus* and *Escherichia coli*. The fungal and bacterial inocula (10<sup>6</sup>/ml) were prepared from spore suspension and cell suspension respectively. Assay of the extracts were done by filter paper disc diffusion method . In each case , inoculum was incorporated (0.1 ml for bacteria and 1 ml for fungi) in respective agar media (P.D.A. for fungi and NA for bacteria). Sterile discs (Brand whatman and diameter of the disc in 6 mm) were soaked in different extracts, allow to stand for 5 min. and were then carefully placed on the freshly prepared Petriplates, seeded with test organisms. Control plates received only in respective solvent i.e. ethanol. The plates were incubated at 28-30°C for 24-96 h for fungi and 37°C for bacteria for a period of 24 h after which the diameter of inhibition zone around the disc was measured.

### RESULTS AND DISCUSSIONS

The assay results (Table 1) showed that all the three lichens have both antifungal as well as antibacterial activities. *Physcia* sp. was most effective against

**Table 1:** *in vitro* activities of extracts of three lichens against some bacteria and fungi

Name of the lichens	Some bacterial and fungal strains (diameter of inhibition zones including diameter of paper discs - 6 mm)									
	Bc	Ec	An	Af	Ab	Cc	Cl	Fu	Pe	Rs
<i>Physcia</i> sp.	14	10	8	9	10	-	-	-	-	11
<i>Cladonia</i> sp.	13	10	11	-	12	-	-	-	12	11
<i>Lecanora</i> sp.	9	8	15	16	12	-	9	-	12	-

Bc = *B. cereus*; Ec = *E. coli*; An = *A. niger*; Af = *A. flavus*; Ab = *A. brassicicola*; Cc = *C. capsici*; Cl = *C. lunata*; Fu = *F. udum*; Pe = *P. expansum*; Rs = *R. stolonifer*; "-" = No inhibition zone

bacterial strain of *B. cereus* and *E. coli* and also among fungal strains like *R. stolonifer*, *A. brassicicola* and *A. flavus* and less effective against *A. niger*. *Cladonia* sp. showed huge amount of activity against the microorganisms *B. cereus*, *E. coli*, *R. stolonifer*, *A. niger* and *A. brassicicola* where as *Lecanora* sp. against *cereus*, *A. flavus*, *A. niger*, *A. brassicicola*, *P. expansum* and *C. lunata* and less amount of activity against *E. coli*. All three lichen extracts showed negative results against *C. capsici* and *F. udum*. The pH value of the extracts *Physcia* sp. and *Lecanora* sp. are 6.8, 6.9 and 6.6 respectively. The present study being a screening programme, employed *in vitro* studies. But all the lichens appear to contain high and promising antifungal and antibacterial properties and also have some extent of anticarcinogenic activity as the fungus likes *A. flavus*, which is a potent aflatoxin producing organism. These activities of the lichens might be due to the synergistic effect of the active principles present in them and hence further investigations are in progress to isolate, purify and characterize these compounds, so that they can be exploited commercially in field condition as a non-toxic, environmentally safe, viable biocontrolling agent.

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