

## Antifungal, antibacterial and insecticidal activities of the endolichenic fungi of the lichen *Usnea* sp. at Hakgala montane forest

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### ABSTRACT

In a search for new bioactive natural products from endolichenic fungal species isolated from the lichens, bioactivity studies of fungi living with lichens were recently initiated and from this study, the potential of ethyl acetate extracts of endolichenic fungi inhabiting the lichen, *Usnea* sp. from Hakgala montane forest was investigated using antifungal, antibacterial and insecticidal properties.

Selected four endolichenic fungal species, *Chrysosporium* sp.1, *Fusarium* sp., *Curvularia* sp. and dark sterile sp.1 were extracted with ethyl acetate (EtOAc) to obtain the secondary metabolites. Antifungal effects of these extracts were tested against *Colletotrichum musae*, which cause anthracnose disease in banana, and the antibacterial activity was investigated against *Bacillus subtilis* and *Staphylococcus aureus* using filter paper disk method and well diffusion method respectively.

Residual film bioassay (RFB) and Treated seed bioassay (TSB) were carried out to evaluate the insecticidal activity of the fungal extracts contained secondary metabolites against cowpea bruchid, *Callosobruchus maculatus*.

The highest yield of the secondary metabolites was obtained from the dark sterile sp.1. (1.0610g). Results of the antifungal activity and antibacterial activity revealed an increase of the diameter of inhibition zone with increasing dose of extracts. EtOAc extracts of *Curvularia* sp. on PDA and PDB showed higher antifungal effects against *C. musae*. Highest inhibition of *C. musae* was observed at the dose of 400 µg of the EtOAc extracts. EtOAc extracts of *Curvularia* sp. on PDA and PDB showed higher inhibitory effects (diameter ~2.0cm) and both *Curvularia* sp. on PDA and PDB extracts showed similar effect with a MIC of 50 µg and *Curvularia* sp. on PDB indicated the lowest MLC of 100 µg against *C. musae*. *Chrysosporium* sp. 1 showed higher antibacterial effects against *Staphylococcus aureus* and *Bacillus subtilis*. Insecticidal assays revealed that percentage mortalities of *C. maculatus* shown in two bioassay methods were not significantly different from each other. Highest mortality (100%) of *C. maculatus* was observed in the EtOAc extracts of *Curvularia* sp. obtained from both PDB and PDA separately. Also the LC<sub>50</sub> values for both Residual film bioassay and Treated seed bioassay confirmed that the lowest values were obtained for EtOAc extracts of *Curvularia* sp. on PDA and PDB.