

Bioactivities of the endolichenic fungi of the lichen *Usnea barbata* at  
Hakgala montane forest

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Lichens as the pioneer organisms, are widely distributed in variety of ecosystems. Other than their obligate symbiotic mycobionts, the lichen thalli provides a mostly unexplored ecological niche for a wide variety of fungi, live endophytically inside the thallus named as endolichenic fungi. The potential of endolichenic fungi as novel resources of bioactive secondary metabolites is still largely unexplored. Present study was carried out in order to understand the status of the endolichenic fungi in one of the dominant lichen species *Usnea barbata* in the lower elevation of Hakgala montane forest.

Fungal isolations were carried out using a standard surface sterilization method and were identified using standard identification keys and following the sticky tape method. The secondary metabolites produced in PDA and PDB of some of the fungal species (*Curvularia* sp., *Fusarium* sp., *Chrysosporium* sp.1, and Dark sterile sp. 1) were extracted into ethyl acetate. Then the solvent was evaporated using rotatory evaporator under reduced pressure to obtain semi solid and Nitrogen gas was passed to remove the remaining solvent.

Antifungal effects of these extracts were tested against *Colletotrichum musae*, which causes anthracnose disease in banana, using filter paper disk method. Residual film bioassay and Treated seed bioassay were done as two separate methods to evaluate the insecticidal activity of the fungal extracts against cowpea bruchid, *Callosobruchus maculatus*.

Eleven endolichenic fungal strains (*Curvularia* sp., *Fusarium* sp., *Nigrospora* sp., *Cladosporium* sp., *Chrysosporium* sp. 1, *Chrysosporium* sp. 2 and five dark sterile sp.) were isolated. The highest yield of the secondary metabolites was obtained from dark sterile sp.1. The result of the antifungal activity against *C. musae* revealed that diameter of inhibition zone was increased with increasing dose of extracts. Highest inhibition of *C. musae* was observed at the dose of 400 µg of the extracts. Extracts of *Curvularia* on PDA and PDB showed higher inhibitory effects and both extracts showed similar effect with a MIC of 50 µg and *Curvularia* on PDB indicated the lowest MLC of 100 µg against *C. musae*. The percentage mortalities of *C. maculatus* shown in two bioassay methods were not significantly different from each other ( $p > 0.05$ ). Highest mortality of *C. maculatus* was observed in extracts of *Curvularia* obtained from PDB and PDA. In addition the LC50 values for both Residual Film Bioassay and Treated Seed Bioassay confirmed that the lowest values were obtained for *Curvularia* on PDA and PDB.

Keywords : Lichens, Endolichenic fungi, *Usnea barbata*.