

Antimicrobial, Antioxidant and Enzyme Activities of *Geosmithia pallida* (KU693285): A Fungal Endophyte Associated with *Brucea mollis* Wall Ex. Kurz, an Endangered and Medicinal Plant of N. E. India

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Abstract : Endophytes are the microbes that colonize living, internal tissues of plants without causing any immediate, overt negative effects. Endophytes are rich source of therapeutic substances like antimicrobial, anticancerous, herbicidal, insecticidal, immunomodulatory compounds. *Brucea mollis*, commonly known as Quinine in Assam, belonging to the family Simaroubaceae, is a shrub or small tree, recorded as endangered species in North East India by CAMP survey in 2003. It is traditionally being used as antimalarial and antimicrobial agent and has antiplasmodial, cytotoxic, anticancer, diuretic, cardiovascular effect etc. Being endangered and medicinal; this plant may host certain noble endophytes which need to be studied in depth. The aim of the present study was isolation and identification of potent endophytic fungi from *Brucea mollis*, an endangered medicinal plant, to protect it from extinction due to over use for medicinal purposes. Aseptically collected leaves, barks and roots samples of healthy plants were washed and cut into a total of 648 segments of about 2 cm long and 0.5 cm broad with sterile knife, comprising 216 segments each from leaves, barks and roots. These segments were surface sterilized using ethanol, mercuric chloride (HgCl₂) and aqueous solution of sodium hypochlorite (NaClO). Different media viz., Czapeck-Dox-Agar (CDA, Himedia), Potato-Dextrose-Agar (PDA, Himedia), Malt Extract Agar (MEA, Himedia), Sabourad Dextrose Agar (SDA, Himedia), V8 juice agar, nutrient agar and water agar media and media amended with plant extracts were used separately for the isolation of the endophytic fungi. A total of 11 fungal species were recovered from leaf, bark and root tissues of *B. mollis*. The isolates were screened for antimicrobial, antioxidant and enzymatic activities using certain protocols. *Cochliobolus geniculatus* was identified as the most dominant species. The mycelia sterilia (creamy white) showing highest inhibitory activity against *Candida albicans* (MTCC 183) was induced to sporulate using modified PDA media. The isolate was identified as *Geosmithia pallida*. The internal transcribed spacer of rDNA was sequenced for confirmation of the taxonomic identity of the sterile mycelia (creamy white). The internal transcribed spacer r-DNA sequence was submitted to the NCBI (KU693285) for the first time from India. *G. pallida* and *Penicillium* showed highest antioxidant activity among all the isolates. The antioxidant activity of *G. pallida* and *Penicillium* didn't show statistically significant difference ($P > 0.05$). *G. pallida*, *Cochliobolus geniculatus* and *P. purpurogenum* respectively showed highest cellulase, amylase and protease activities. Thus, endophytic fungal isolates may be used as potential natural resource of pharmaceutical importance. The endophytic fungi, *Geosmithia pallida*, may be used for synthesis of pharmaceutically important natural products and consequently can replace plants hitherto used for the same purpose. This study suggests that endophytes should be investigated more aggressively to better understand the endophyte biology of *B. mollis*.

Keywords : Antimicrobial activity, antioxidant activity, *Brucea mollis*, endophytic fungi, enzyme activity, *Geosmithia pallida*

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