

ORIGINAL ARTICLE

Nature and bioactivities of endolichenic fungi in *Pseudocyphellaria* sp., *Parmotrema* sp. and *Usnea* sp. at Hakgala montane forest in Sri Lanka

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Abstract

Aim: The aim of this study was to investigate the nature and bioactivities of endolichenic fungi in three abundant lichens, *Pseudocyphellaria* sp., *Usnea* sp. and *Parmotrema* sp. in the lower elevation of Hakgala montane forest in Sri Lanka.

Methods and Results: Endolichenic fungal strains, fungi that live asymptotically in the lichen thallus, much the same way as endophytic fungi live within healthy plant tissues, were isolated from three abundant lichen species, *Pseudocyphellaria* sp., *Usnea* sp. and *Parmotrema* sp., at Hakgala montane forest in Sri Lanka, using the surface sterilization method. Nine endolichenic fungal strains were isolated from *Parmotrema* sp. and *Usnea* sp. separately, while 11 endolichenic fungi were recovered from the lichen *Pseudocyphellaria* sp. Isolation of endolichenic fungus *Chrysosporium* sp. 2 was common to all three lichen species. Substrate utilization patterns and antifungal activities of eight endolichenic fungal species were evaluated and the results revealed that all the test fungi were able to produce at least one enzyme to utilize the test substrates. *Nigrospora* sp., *Chrysosporium* sp. 1 and 2 and *Cladosporium* sp. showed antifungal activities on growth of some selected plant pathogenic fungi.

Conclusions: Endolichenic fungal strains (29) were isolated from the lichens *Parmotrema* sp., *Usnea* sp. and *Pseudocyphellaria* sp. in Sri Lanka. *Chrysosporium* sp. 2 was common in all three lichens. Some of these endolichenic fungal strains showed antifungal activities against common plant pathogenic fungi and they are capable of utilizing the substrates by producing specific enzymes.

Significance and Impact of the Study: The diversity and prevalence of the endolichenic fungi have not been studied extensively and this is the first report of isolation and identification of endolichenic fungi in lichens available in Sri Lanka.

Introduction

Lichens are formed from a combination of a fungal partner (mycobiont) and an algal partner (photobiont). They will grow anywhere that a stable and reasonably well-lit surface occurs. This may include soil, rocks or even the barks of trees. Most lichens are temperate or Arctic, although there are many tropical and desert species (Nash

1996; Devarajan and Suryanarayan 2006). In addition to the fungal mycobiont in lichen thalli, the occurrence of nonobligate microfungi inside lichen thalli has recently been identified. These fungi occur asymptotically within thalli and are named as 'endolichenic fungi' (Paranagama *et al.* 2007). Endolichenic fungi live within the lichen thallus much the same way as endophytes live between cells in plant tissues. A thorough literature survey