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Diversity of Lichenized Photobionts and Mycobionts and Phytochemistry of Lichens in the Pilikuththuwa Forest Reserve, Sri Lanka

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Background: Lichens are symbiotic associations between a fungus (mycobiont), and one or more phototrophic algae and/or cyanobacteria (photobionts).

Objectives: This study was conducted to identify the lichen species in Pilikuththuwa Forest Reserve, screen the phytochemical constituents present in lichen thallus and determine their photobiont and mycobiont partners.

Methods: Ten morphologically different lichen species from tree trunks, branches and rocks were collected from all accessible areas of Pilikuththuwa Forest Reserve. Morphological and anatomical characters were examined and spot tests were used for lichen species identification. Preliminary phytochemical screening was carried out using chloroform, ethyl acetate, acetone and methanol extracts. Cyanobacteria, algae and fungi associated with lichens were isolated separately and identified up to genus level using their morphological characters. To isolate cyanobacteria, the cleaned parts of the lichens were inoculated into cyano-specific liquid BG11 and BG11₀ media while Bold Basal Medium (BBM) was used for the isolation of algae.

Results: Eight lichen species were tentatively identified as *Dirinaria* spp. (two species), *Crocynia* spp. (two species), *Graphis* spp. (one species), *Carbocanthographis* sp. (one species), *Ocellularia* spp. (one species) and *Opegrapha* sp. (one species). The methanolic extract was more active and showed almost all tested phytochemicals such as tannins, saponins, flavonoids, glycosides and carbohydrates in all the lichen samples. Several photobiont genera were observed representing five cyanobacterial genera namely *Dermocarpa*, *Chroococcus*, *Nostoc*, *Synechococcus* and *Gloeocapsa* and five algal genera namely *Cladophora*, *Chlorella*, *Heveochlorella*, *Trebouxia* and *Stichococcus*. The most prevalent cyanobacterial species across all lichen samples belonged to the genus *Synechococcus* while the most prevalent algal species belonged to the genus *Trebouxia*. The five fungal genera, i.e. *Lasiodiplodia*, *Trichoderma*, *Purpureocillium*, *Rhizopus* and *Mucor* were isolated from the collected lichen species and *Lasiodiplodia* sp. was the most commonly occurring species.

Conclusion: Even within the same lichen species, photobiont and mycobiont diversity varied, suggesting unique species-specific photobiont-mycobiont combinations.

Keywords: Lichens, Mycobiont, Photobiont