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**STUDY OF DIVERSITY AND TAXONOMY OF LICHENS IN THE  
HORTON PLAINS NATIONAL PARK WITH A VIEW TO  
BIOMONITOR THE ECOSYSTEM HEALTH**

A THESIS PRESENTED BY

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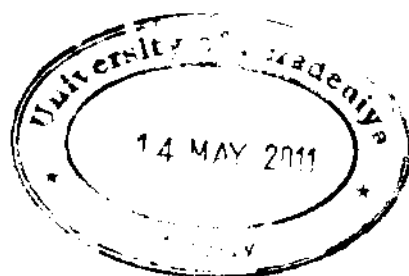
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**STUDY OF DIVERSITY AND TAXONOMY OF LICHENS IN THE HORTON  
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This study was carried out to provide a taxonomic description of lichen flora at Horton Plains National Park (HPNP) and correlate the distribution of lichens to ecological continuity in different forest types. In the present study, lichens from 12 transects within continuous forest and forest islands were selected using a remote sensing map of HPNP. Types of lichens and their diversity in relation to light intensity, temperature, tree species, density, height, diameter and the distribution pattern of trees within each transects were recorded. Further, ecological continuity was determined between continuous forest and forest islands using selected indicator macrolichen genera. Air quality monitoring in the HPNP was also carried out to determine the lichen species sensitivity to the disturbance or air pollution in HPNP.

A total 379 lichen species belonging to 67 genera and 24 families were identified. This study documented several new lichen taxa for Sri Lanka that consists of 6 genera and 46 species. The 6 new lichen genera were composed of 3 foliose (*Anzia*, *Menegazzia*, *Kroswia*), 2 crustoses (*Parathelium*, *Pleurotheliopsis*) and 01 fruticose (*Polichidium*) lichens. Similarly, the 46 new lichen species were composed of 5 species of crustose, 38 species of foliose and 3 species of fruticose lichens. The total number of lichen taxa recorded in this study was more than 50 % of the lichen taxa already recorded from Sri Lanka.

A principal component analysis (PCA) of site data, tree data and lichen cover shows that most lichens are highly correlated with the bark pH and light intensities. Most of the lichens present in the study plots preferred relatively high pH range (5.0-6.0). The most dominant lichen species (314 species) within this pH range were macrolichens like *Lobaria retigera*, *Pseudocyphellaria beccarii*, *Heterodermia microphylla* and microlichens like

*Graphis* sp. *Myriotrema* sp.. The number of lichen colonies increased with increasing diameter class from 5-10 cm up to 11-20 cm and they decreased with increasing diameter size of the lichen host species. The highest number of lichen colonies was found on hosts of 11-20 cm diameter class in both forest types. Smooth bark type had the highest diversity of lichens in both forest types and this was followed by smooth to rough bark type. The least lichen diversity was observed on deeply furrowed bark type in the continuous forest, while in the forest islands, this was observed on flaky bark type.

Cluster analysis conducted on cover and frequency of genera selected as indicators of ecological continuity showed two marked clusters depicting continuous forest and forest patches, the former supporting fewer taxa at lower frequency and cover. Indicator taxa restricted to the forest patches included species of *Nephroma* and *Teloschistes*. Large foliose species of *Pseudocyphellaria*, *Lobaria* and *Sticta* occurred in both forests, but at lower frequency and cover in continuous forest.

The data revealed that the concentrations of ambient  $\text{NO}_2$  and  $\text{SO}_2$  were very low in HPNP. The variations of ambient  $\text{NO}_2$  and  $\text{SO}_2$  concentration during the study period showed insignificant positive correlation ( $p \geq 0.05$ ) with the rainfall pattern. Considering the variations of two pollutants with RH and number of vehicles visiting HPNP, both pollutants had insignificant positive correlation. The IAP value obtained for the whole area of the HPNP was 54.22. This value belonged to the quality level 5 which represent the 'very low' pollution level. The results including lichen data and air quality data could confirm that the ambient air quality at HPNP is very high. The high diversity of lichens and the minimal levels of air pollutants suggested that the forest health at HPNP is highly conserved. Therefore, it is a must to maintain at least the current conditions of HPNP in order to conserve the forest and its biodiversity.