

**Distributional Ecology of Filmy Ferns and Grammitid Ferns of Sri Lanka:
The Most Sensitive Ferns Species for Changing Climate**

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Abstract

The filmy ferns (family Hymenophyllaceae) and grammitid ferns (family Polypodiaceae) are generally considered the most sensitive ferns to changing climate. The family Hymenophyllaceae is characterized by its translucent fronds with mostly one or a few cell thicknesses. The grammitid ferns were earlier treated as a separate family, the Grammitidaceae, and with the recent molecular work, they were nested within the family Polypodiaceae. Both families are mostly epiphytic or rupestral, but very rarely present in terrestrial habitats. Sri Lanka harbours 20 species of filmy ferns, including one endemic, and 22 species of grammitid ferns with eight endemics. Most species are confined to humid and shady environments in the rainforest ecosystems of Sri Lanka. Though both families are rich in information on their phylogeny, details are not available on their distributional ecology, conservation biology, population dynamics, environmental services, and reproductive biology on both regional and global scales. This study aimed to understand their distributional ecology in Sri Lanka by analyzing past records over the last one and a half centuries. The handbook to the Flora of Ceylon (Volume 15A and 15B) was used as a base document and collector's information, date of collection, locality of each specimen, and deposited herbaria were studied referring to 752 specimens deposited at 22 worldwide herbaria. The distribution maps were prepared using QGIS software. The results revealed that except for Ritigala Strict Nature Reserve, all other specimens have been collected from the intermediate and wet zones of Sri Lanka. According to distribution maps, these species have been recorded from 13 administrative districts, with the highest number of species recorded in Nuwara-Eliya (59.5%), Kandy (59.5%), and Rathnapura (50%) districts. The central province can be considered the most sensitive area for filmy ferns and grammitid ferns. *Crepidomanes kurzii* and *Prosaptia ceylanica* show restricted distribution patterns and are confined to two single known localities in Kandy and Matara districts, respectively. Furthermore, *P. ceylanica* is only known for its type locality in the Matara district. *Abrodictyum obscurum* is the only terrestrial species in both families and it is mostly confined to streamside banks of lowland rainforests. Out of the 42 species studied in both families, 9 and 2 species are treated as critically endangered and possibly extinct species, respectively. The study emphasizes that an island-wide survey is urgently needed to further validate the outcome of the present study. It also provides useful information for setting future conservation and management guidelines for this unique group of plants.

Keywords: Distributional ecology, Mapping, Pteridophytes, Filmy ferns, Grammitid ferns