筆筒樹萎凋病植群生態及病理之研究

Vegetation and etiological studies of *Cyathea lepifera* wilt

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摘要

筆筒樹，屬於桫欏科樹蕨及瀕臨絕種野生動植物國際貿易公約二級珍貴稀有物種，為研究植物演化與生物地理的活化石物種。筆筒樹於世界之分布，主要以臺灣為中心，並在周邊地區如中國東南部、沖繩，及菲律賓，可發現其存在。近年來，臺灣北部地區發現許多萎凋及死亡之筆筒樹，但致病原因及病害擴散機制，仍不甚清楚。本研究選定臺灣筆筒樹高密度原生地陽明山國家公園為研究範圍，目標在建立健康及罹病死亡筆筒樹之族群分布及棲地資訊，探討筆筒樹萎凋病病因，病害擴散情形，以及病害綜合防治策略。根據高解析正射空照影像與地理資訊系統分析，估計陽明山國家公園約有四萬餘棵筆筒樹，並且偏好分布在海拔 200 到 800 公尺間，中坡率，北向至東北向之坡向，以及溪谷地形之棲地。樣區調查顯示，健康及罹病筆筒樹之植群結構，並無明顯差異。經由完成科霍氏法則印證，顯示主要病原菌為一屬於黑腐皮殼菌科的新種真菌。病害流行監測發現，2010 及 2011 年間，陽明山國家公園病害之發生率分別為 12.6%與 14.5%，並且病害有持續擴散的現象。對於防治藥劑及施用方法，亦進行篩選與評估。本研究之結果，對於筆筒樹之植群生態結構，已有深入了解，萎凋病之病原因子，亦已確認；唯病害之監測，須持續進行，並且病原菌之傳播擴散機制，仍有待進一步研究。

關鍵詞：筆筒樹萎凋病，植群，病因研究，地理資訊系統，陽明山國家公園

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ABSTRACT

Cyathea lepifera (J. Sm. ex Hook.) Copel., a tree fern belonging to Cyatheacea, is an important living fossil for the research of plant evolution and biogeography, which is under protection by the Convention on International Trade in Endangered Species of Wild Fauna and Flora. *C. lepifera* are mainly distributed in Taiwan, and can also be found in the surrounding regions including southeast China, Ryukyu, and Philippine. In the past few years, many wilted and dead trees of *C. lepifera* were discovered in the northern part of Taiwan; however, the cause and dissemination of the disease were not clear. In this study, we aimed to establish the spatial distribution of healthy and dead tree ferns in Yangmingshan (YMS) National Park, to study the vegetation of *C. lepifera*, to determine the cause of the death, to monitor the spread of the disease and finally to provide the integrated disease management measures. According to high resolution aerial photographs, we digitized the *C. lepifera* trees in the Park and the population of more than 40,000 trees was estimated. Based on the analyses of digitized data with DTM (Digital Terrain Model) in the geographic information systems (GIS), we found that *C. lepifera* favors elevation between 200 and 800 meter high, middle slope, north and northeast aspects, and also prefers to grow in the valley where flow accumulation is greater than zero. Vegetation surveys among twenty-six plots revealed that no significant variation was observed in the vegetation structure of *C. lepifera.* Etiological studies revealed the cause of *C. lepifera* wilt was a new fungal pathogen belonging to Diaporthaceae. Epidemiological surveillance revealed that disease rate of *C. lepifera* wilt was 12.6% and 14.5% in 2010 and 2011 in YMS National Park and the disease has been continually spreading in several locations. Finally, effective fungicides and application measures were screened and evaluated. Our studies provide better understandings of the vegetation ecology of *C. lepifera* and determine the etiological agent of *C. lepifera* wilt disease; however, disease monitoring needs to continue and the spread and

dissemination of the pathogen in the field require further investigation.

Key Words: *Cyathea lepifera* wilt, vegetation, etiological studies, geographic information system, Yangmingshan National Park