泥炭地不同土地利用之土壤調查與分析

Soil Survey and Analysis of a Peatland across Different Land Use Types

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摘　要

全球泥炭地雖僅占陸地面積的 3%，但其土壤碳儲存量占全球土壤碳的 44%，碳儲存能力超過其他所有類型植被的總和，因此保護泥炭地是減緩氣候變化的關鍵策略之一。根據美國農業部定義，泥炭土（Peat soil）為有機質含量至少 20%以上的土壤。

南投縣魚池鄉頭社盆為臺灣最大面積泥炭土，為探討其土壤特性本研究針對頭社盆地進行土壤性質分析調查，研究範圍約 140 公頃，並以網格法區分為 10 個區域，每區選取 1 個點位，原訂 10 個採樣點，考量不同土地利用型態增加一點位，合計 11 點位（旱田-1 至娛樂用地-11）。採樣深度為 0-100 公分，分為 20 層。

調查結果顯示，頭社盆地各採樣點土壤總碳含量均高於臺灣代表性農地，其中娛樂用地-10 娛樂用地-11 具有較高的有機碳含量，保留了泥炭土的特徵。土壤酸鹼度多數偏酸性，且隨深度增加呈現下降的趨勢，這與熱帶泥炭土的酸鹼範圍相符。多數採樣點的土導電度(EC)值在 0.8~1.5dS m-1 範圍內，顯示未有鹽類累積或鹽害問題。陽離子交換容量（CEC）結果顯示，果樹-7（香蕉園）和娛樂用地-10 在深層土壤中有較高的 CEC 值。泥炭土層的密度普遍較低，與國際數據相符。研究結果顯示，頭社盆地具有豐富的碳匯資源，並提供未來土壤管理和保育策略提供科學依據。

關鍵詞: 泥炭土、土壤碳儲量、土地利用、土壤性質

Abstract

Although peatlands account for only approximately 3% of the Earth's terrestrial surface, they store about 44% of the world’s soil carbon—more than the combined carbon storage capacity of all other types of vegetation. As such, peatland conservation is considered one of the most critical strategies for mitigating climate change. According to the United States Department of Agriculture (USDA), peat soils are defined as soils with an organic matter content of at least 20%.

The Toushe Basin, located in Yuchi Township, Nantou County, is the largest peat soil area in Taiwan. This study aimed to investigate the soil properties of this basin through a systematic soil survey. The study area covers approximately 140 hectares and was divided into 10 grid-based zones, with one sampling point selected per zone. To account for diverse land use types, an additional site was included, resulting in a total of 11 sampling points (from Dryland-1 to Recreational Land-11). Soil samples were collected from a depth of 0–100 cm and stratified into 20 cm intervals.

The results showed that all sampling points in the Toushe Basin exhibited higher total soil carbon content than typical agricultural lands in Taiwan. Notably, Recreational Land-10 and -11, located in the active peatland core, had particularly high organic carbon content, reflecting well-preserved peat soil characteristics. Soil pH was generally acidic and tended to decrease with depth, consistent with the typical pH range of tropical peat soils. Most sampling sites had electrical conductivity (EC) values between 0.8 and 1.5 dS m^{-1}, indicating no signs of salt accumulation or salinization. Cation exchange capacity (CEC) was relatively high in the deeper soils of Orchard-7 (banana plantation) and Recreational Land-10, suggesting better nutrient retention potential. Soil bulk density across peat layers was generally low, aligning with international peat soil benchmarks.

Overall, the Toushe Basin demonstrates substantial carbon sequestration potential. The findings of this study provide a scientific foundation for future peatland management, land-use planning, and conservation strategies in Taiwan.

Keywords: Peat soil, Soil carbon storage, Land use, Soil properties.