

Factors influencing the spatial distribution of soil organic carbon storage in South Korea

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Abstract

Soil organic carbon (SOC) is a critical component of soil health and is crucial in mitigating climate change by sequestering carbon from the atmosphere. Accurate estimation of SOC storage is essential for understanding SOC dynamics and developing effective soil management strategies. This study aimed to investigate the factors influencing the spatial distribution of SOC storage in South Korea, using bulk density (BD) prediction to estimate SOC stock. The study utilized data from 393 soil series collected from various land uses across South Korea established by Korea Rural Development Administration from 1968–1999. The samples were analyzed for soil properties such as soil texture, pH, and BD, and SOC stock was estimated using a predictive model based on BD. The average SOC stock in South Korea at 30 cm topsoil was 49.1 Mg/ha. The study results revealed that soil texture and land use were the most significant factors influencing the spatial distribution of SOC storage in South Korea. Forested areas had significantly higher SOC storage than other land use types. Climate variables such as temperature and precipitation had a relative influence on SOC storage. The findings of this study provide valuable insights into the factors influencing the spatial distribution of SOC storage in South Korea.

Keywords: Soil organic carbon stock, Soil texture, Climatic factors, Bulk density

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