COMPARATIVE ANALYSIS OF ORGANIC SOIL HORIZON CHARACTERISTICS AND CARBON SEQUESTRATION POTENTIAL IN OAK AND PINE FORESTS OF THE SOUTHEASTERN UNITED STATES

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Forest ecosystems are the largest terrestrial carbon (C) sink for the United States, and the Southeastern United States. Forest ecosystems are a crucial part of the C sink. The capacity of forest ecosystems to act as terrestrial C sinks is significantly influenced by the characteristics of the organic soil horizon, which encompasses both leaf litter and duff. This study presents a comparative analysis of organic soil horizon characteristics between two prominent forest types in the Southern United States: oak and pine forests. We hypothesized that different forest types with different fire disturbance histories lead to variations in C sequestration potential and storage mechanisms. We examined soil organic horizon characteristics such as depth, bulk density, and C content across Southeastern U.S. oak (*Quercus* spp.) and pine (*Pinus* spp.) stands. Using standardized methodology, we sampled soil organic layer (SOL) from various oak and pine forests, considering the impacts of forest composition, structure, and fire disturbance history on soil carbon pools. Our preliminary analysis revealed differences in SOL properties, attributable to litter quality, decomposition rates, and C storage capacity. The findings suggest that oak forests, with distinct SOL characteristics, may uniquely contribute to C storage, differing from pine forests. This study enhances understanding of forest-specific C dynamics, providing a foundation for more accurate soil C estimation models in diverse ecosystems. The implications are critical for management and conservation strategies to maximize C sequestration, thereby enhancing Southeastern U.S. forests' role in climate change mitigation.

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