NUTRIENT DISTRIBUTION ACROSS DEEP SOIL PROFILES UNDER DIFFERENT MANAGEMENT PRACTICES

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Phosphorus (P) loss from agricultural fields constitutes a significant and persistent challenge, resulting in the deterioration of downstream aquatic ecosystems and protracted eutrophication. An important process controlling P transport in agricultural soils is the mineralization and subsequent mobilization of organic matter near the soil surface and up to depths of 100 cm within the soil profile. This phenomenon underscores the critical role that both surface and deep soil layers play in P dynamics within agricultural systems. These dynamics are further influenced by a combination of natural conditions and agricultural management practices. This study aims to elucidate variations in soil attributes across different depths within two distinct long-term management systems employed in Florida's beef cattle production grasslands: intensively-management and semi-native management. A total of 47 deep soil cores were sampled throughout our ranch, encompassing a depth range from 0 to 100 cm. Total P, Mehlich-1 P, Mehlich-3 P, Al, Fe, organic matter, pH, nitrogen, and carbon were quantified at each soil depth. The results showed that all three forms of P exhibited higher concentrations in the uppermost soil layer (0-15 cm) and the deepest soil layer (90-100 cm) under both management practices, with relatively lower P concentrations observed in the middle soil depths. Intensively managed grasslands exhibited reduced P concentrations in the upper soil layer, gradually increasing as depth extended toward the lower layers. Concurrently, soil nitrogen, carbon, and organic matter predominantly accumulated in the uppermost soil layer, with minimal representation below a depth of 30 cm for both management systems. Most sampled sites displayed negative Soil Phosphorus Storage Capacity (SPSC), signifying reduced soil P retention and the potential as P sources. These soil characteristics with substantial negative SPSC may significantly threaten subsurface water quality, emphasizing the need for comprehensive soil management to curb phosphorus losses and safeguard regional water quality.

PRESENTER BIO: Mrs. Ran Zhi is an interdisciplinary ecology Ph.D. student at the University of Florida. Her current research area centers on the management of legacy phosphorus in agricultural ecosystems. In her work, she aims to develop models for legacy phosphorus behavior in ecosystems and devise management strategies to mitigate its environmental impact.