The affects of vegetation communities on soil organic carbon storage in a enclosed desert-steppe region of northern China

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Abstract

Abstract: Enclosure is playing an important role in the storage of soil organic carbon (SOC) and root biomass accumulation in desert steppe. However, plant community types are complex and diverse in desert steppe of Inner Mongolia, northern China. This study analyzed relationships between plant communities and surface soil organic carbon stock (SOCS) in a desert steppe environment of Inner Mongolia. Total root biomass for S. breviflora, K. cristata, L. chinensis, S. krylovii, C. ammannii and A. mongolicum were 268.00, 731.71, 356.16, 305.73, 229.21 and 299.74 g/m2, respectively. Average SOC for S. breviflora, K. cristata, L. chinensis, S. krylovii, C. ammannii and A. mongolicum were 7.54, 11.75, 8.40, 7.14 6.07 and 7.17 g/kg, respectively. The upper 0-10 cm soil contained the highest amounts of root biomass and SOC, both of which gradually decreased with soil depth. Total SOCS for the six different types of plant communities ranged from 2.77 to 4.49 kg/m2 at 0-30 cm soil depth. SOC correlated positively with root biomass, clay and silt content and negatively with sand content over the 0-30 cm interval. Stratification ratios (SRs) of SOC increased with soil depth for different plant communities (except C. ammannii and A. mongolicum). This indicates better soil quality associated with S. breviflora, K. cristata, L. chinensis and S. krylovii, communities. Due to their influence on SOC distribution and soil properties, root systems are a key factor in grassland restoration. Root systems of plant communities in desert steppe environments also appear to represent major carbon sinks.

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