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Soil texture controls vegetation biomass and soil organic carbon storage in arid desert grassland in the middle of Hexi Corridor region of northwest China

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Abstract
Soil texture may play an important role in controlling vegetation distribution pattern and net primary production, as well as soil organic carbon (SOC) concentration and stock in arid desert grassland ecosystem. However, little information is available in the current literature on the occurrence and extent of these textural effects in arid desert grasslands in northwest China. The main objective of this study was to quantify the relationships between soil texture (silt + clay) and above-and below-ground biomass, SOC concentration and stock in arid Hexi corridor desert grasslands of northwest China. Above-and below-ground biomass were investigated and SOC concentration, bulk density, stone content, and soil particle size distribution at the seven layers of 100cm profile were determined in the selected 32 grassland sites located in the similar topographical units (alluvial-diluvial fans) in the study area. The results showed that above-ground biomass was higher than below-ground biomass, with a mean value of 0.67 in the below-ground biomass / above-ground biomass ratio (R/S). More than 95% of below-ground biomass distributed in the top 30 cm depth. Spatially, desert grassland vegetation biomass was positively related to soil sit+clay content. The mean SOC density in the 0-100 cm depth was 2.94 kg m-2 in the arid desert grasslands. SOC concentrations and stocks were positively and significantly related to silt+clay content for the seven soil layers sampled up to a depth of 100 cm. Soil silt+clay content explained 42%-79% of the variation in SOC stocks. In conclusion, soil texture appeared to have an important impact on the vegetation productivity and distribution pattern, and is an important controlling factor of SOC stocks in arid Hexi Corridor grassland soils.
Keywords: soil texture, vegetation biomass, SOC stock, arid desert grassland, northwest China