EGU21-9324, updated on 29 Jun 2022
https://doi.org/10.5194/egusphere-egu21-9324
EGU General Assembly 2021
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Effects of textural layering on water regimes in sandy soils in a desert-oasis ecotone, Northwestern China

Chengpeng Sun[1], Wenzhi Zhao[1], Hu Liu[1], Yongyong Zhang[1], and Hong Zhou[2]
[1]Key Laboratory of Ecohydrology and River Basin Science, Northwest Institute of Eco-environment and Resources, Chinese Academy of Sciences, Lanzhou, China (kych@lzb.ac.cn)
[2]Northwest Normal University, Lanzhou, China

Textural layering of soil plays an important role in distributing and regulating resources for plants in many semiarid and arid landscapes. However, the spatial patterns of textural layering and the potential effects on soil hydrology and water regimes are poorly understood, especially in arid sandy soil environments like the desert-oasis ecotones in northwestern China. This work aims to determine the distribution of textural layered soils, analyze the effects of different soil-textural configurations on water regimes, and evaluate which factors affect soil water infiltration and retention characteristics in such a desert-oasis ecotone. We measured soil water content and mineral composition in 87 soil profiles distributed along 3 transects in the study area. Constant-head infiltration experiments were conducted at 9 of the soil profiles with different texture configurations. The results showed that textural layered soils were patchily but extensively distributed throughout the study area (with a combined surface area percentage of about 84%). Soil water content in the profiles ranged from 0.002 to 0.27 g/cm^3 during the investigation period, and significantly and positively correlated with the thickness of a medium-textured (silt or silt loam) layer ($P < 0.001$). The occurrence of a medium-textured layer increased field capacity (FC) and wilting point (WP), and decreased available water-holding capacity in soil profiles. Burial depth of the medium-textured layer had no clear effects on water retention properties, but the layer thickness tended to. In textural layered soils, smaller water infiltration rate and cumulative infiltration, and shallower depths of wetting fronts were detected, compared with homogeneous sand profiles. The thickness and burial depth of medium-textured layers had obvious effects on infiltration, but the magnitude of the effects depended on soil texture configuration. The revealed patterns of soil textural layering and the potential effects on water regimes may provide new insight into the sustainable management of rainfed vegetation in the desert-oasis ecotones of arid northwestern China and other regions with similar environments around the world.