

Soil Structural Stability Assessment Using Wet-Sieving Method in Selected Rangeland Sites in Isfahan Province

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Abstract

Soil aggregate stability is considered as a key indicator of soil quality and health assessments in rangelands. Many factors and properties such as soil texture, organic carbon, calcium carbonate, sodium adsorption ratio, and electrical conductivity might affect soil aggregate stability. The effects of these factors on aggregate stability of 71 soil samples collected from 4 rangeland sites (2 in semi-arid and 2 in arid lands) in Isfahan province were investigated. Aggregate stability was measured using the wet-sieving method. To optimize the trial conditions for the investigated soils, three shaking times (5, 10 and 15 minutes) were used to impose different hydromechanical stresses on the aggregates of ten soils selected out of the studied soils. The structural stability was assessed using mean weight diameter (MWD) and geometric mean diameter (GMD) of the water-stable aggregates. Significant differences of MWD were observed between the shaking times. The 10-min shaking was selected as best for structural stability assessment in the studied regions because it resulted in better differentiation of soils on the basis of structural stability. Among the intrinsic properties, soil organic carbon content had the most important role in aggregate stability in all zones. However, electrical conductivity (in addition to organic carbon content) had an important role in aggregate stability in the arid rangelands. Log-normal distribution and GMD could represent better the aggregate size distribution when compared with normal distribution and MWD in the studied regions. Overall, wet-sieving method with shaking time of 10 min is suggested to assess the soil structural stability in rangelands of Isfahan province. Therefore, soil aggregate stability and the factors affecting this vital indicator can be used efficiently for assessing and monitoring management effectiveness and rangeland functionality trend.

Keywords: Soil structural stability, Mean weight diameter, Geometric mean diameter, Organic carbon, Electrical conductivity, Isfahan province.

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