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Saturated Hydraulic Conductivity As Affected By Skeleton Content in Tipic Usticfluents under Paddy and Grassland use

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Abstract
The aim of this study was to evaluate relations between saturated hydraulic conductivity (Ks) and physical, chemical, and morphological properties of soils used as paddy field and grasslands. Total 112 undisturbed soil columns (15 cm length and 8.0 cm id.) were collected from a paddy field (70 samples) and an adjacent grassland (42 samples) from two dephts (0-15 cm and 15-30 cm). Synchronized disturbed soil samples were taken from the same sampling points and depths for basic soil analyses (soil texture, bulk density, penetration resistance, soil reaction (pH), specific surface area, cation exchange capacity, aggregate stability, field capacity, wilting point, linear expansion coefficient (COLE), organic matter content, soil skeleton content, and calcium carbonate). Saturated hydraulic conductivity was measured on the soil columns using a constant-head permeameter. Following the Ks measurements, the colums were left to dry to around field capacity in the laboratory and then samples were taken for bulk density and then penetration resistance was measured on the columns. The soils were disturbed and morphological properties of soil color, soil structure, pores, roots, consistency, and plasticity were described by standard soil description charts used in soil survey studies. In addition, soil texture, bulk density, soil reaction (pH), field capacity, wilting point, cation exchange capacity, specific surface area, aggregate stability, organic matter content and skeleton content, and calcium carbonate content were measured on the synchronized disturbed soil samples. Laboratory measured Ks-values had a mean of 0.83 cmh-1 and changed between 2.71 and 0.0036 cm h-1. The measured Ks values were related to soil parametric and morphological properties by multiple linear regressions. Soil skeleton content, spesific surface area, root size, structure size, and root quantity significantly related to Ks in paddy soils, and skeleton content, clay content, pH, organic matter, and consistence significantly related to Ks in grassland soils. Soil skeleton content described 89% ($P<0.001$) total variationof Ks in paddy soils and 85.2% ($P<0.001$) in grassland. The results showed that soil skeleton content had a very significant effect on the hydraulic properties of studied soils.
Key words: Saturated hydraulic conductivity, soil skeleton content, multiple regressions, soil coarse fraction.
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