ABSTRACTS

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S2 ES in Rural landscapes in Brazil

Effects of management systems on some soil physical and hydraulic properties and ecosystem services at Caatinga biome, Ceará State, Brazil

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Soil physical and hydraulic properties can be changed by management and promote impact on ecosystem services and sustainability in farmlands. Our objective was to determine soil surface unsaturated hydraulic conductivity (Khu) in farmland under soil management systems of the Caatinga biome (semiarid region with thorny and deciduous vegetation) in the micro-region of Crateús, in the State of Ceará, northeastern Brazil. The Khu was measured in six places, at 0-10 cm depth: 1) corn+bean anual crops, conservation tillage; 2) agroforestry system, sand loam surface texture, granular and angular blocky structure; 3) corn+bean anual crops with intense mechanic soil tillage; 4) natural pastureland, sand surface texture, single grain, weak structure; 5) corn+bean, mechanic soil tillage; and 6) reference area, dry forest, Caatinga vegetation, sand surface texture, single grain, weak structure. Surface hydraulic conductivity was measured using a Decagon mini-disk model S, with three local measurements by place, at a pressure head of −2 cm. To correct for surface irregularities and improve contact between the soil and infiltrometer, disk placement locations were prepared by clipping vegetation at the ground and flattenning the surface. Measurements of the amount of water entering the soil were taken every 30 seconds. Estimations of hydraulic conductivity from steady infiltration were made measuring cumulative infiltration vs. time and fitting the results to compute the hydraulic conductivity of the soil. Samples of soil were collected at the 0 – 20 cm depth to determine soil moisture. Water content in soil ranged from 5.7 to 14.7% and showed a positive relationship with Khu. The Khu values ranged from 0.0122 to 0.2905 cm.min-1. In general, it was observed that density of the surface layer increased with use of agricultural machinery to soil tillage, resulting in higher mechanical resistance to penetration and reduction of Khu from 0.043 to 0.012 cm.min-1. The highest percentage of sand fraction in granulometry also led to an increase in Khu.

Keywords: Land use; water scarcity; sustainable production system; soil quality; semiarid climate.