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RESEARCH PAPER

Water retention characteristics of red lateritic soils, red soils and black soils of Tamil Nadu in relation to soil texture

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Abstract: The present study was carried out to estimate the available water capacity of 246 soil samples collected from red lateritic soils of Dryland Agricultural Research Station, Chettinad, native red soils and application of transported black soils over the red native soils of Maize Research Station, Vagarai and black soils of Cotton Research Station, Veppanthattai of Tamil Nadu. The soils were analyzed for field capacity at 1/3 bar (33kpa) pressure and permanent wilting point at 15 bar (1500kPa) pressure in pressure plate apparatus besides, organic carbon and particle size distribution (soil texture) in surface and subsurface soils. In red lateritic soils the moisture retention at field capacity ranged from 13.2 to 20.5 and 13.8 to 22.5 per cent, at permanent wilting point ranged from 5.4 to 10.9 and 4.9-11.6 per cent and available water capacity (moisture retained between 1/3 bar and 15 bar pressure) varied from 4.3 to 13.3 and 4.9 to 13.7 per cent. The moisture retention of application of transported black soils over native red soils varied from 29.2-30.4 and 19.8-22.7 per cent, at permanent wilting capacity varied from 14.8-16.9 and 7.6-9.2 per cent and the available water capacity varied from 13.6-15.5 and 11.9-14.1 per cent. The moisture retention of native red soils at field capacity varied from 16.2-19.4 and 16.2-18.5 per cent, at permanent wilting capacity varied from 5.4-7.6 and 4.9-7.8 per cent and the available water capacity varied from 10.2-11.6 and 11.3-11.9 per cent. The moisture retention of black soils at field capacity ranged from 30.8 to 39.7 and 32.4 to 40.8 per cent, at permanent wilting point 15.3 per cent to 22.9 and 16.9-24.6 per cent. The available water capacity varied from 13.5 per cent to 18.5 and 13.8-18.4 per cent in both the surface and sub-surface soils, respectively. The sub-surface soils of transported black soils over native red soils have high moisture retention capacity than native sub-surface soils. The available water capacity and maximum water holding capacity in all the soils were in the order of black soils>transported black soils over the native red soils> red soils> red lateritic soils. The soil parameters viz., organic carbon, sand silt and clay significantly influenced the field capacity of soils. The transported black soils over native red soils is beneficial for retaining the more soil moisture for sustaining crop growth particularly in rainfed situations under changing climate.

Key Words : Water retention characteristics, Red lateritic soils, Red soils, Transported black soils over the red soils, Black soils soil texture, Pressure membrane apparatus

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