

Title: Effects of tillage on soil microrelief, surface depression storage and soil water storage

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Abstract

Conservation of soil water is an important management objective for crop production in the semi-arid tropics where droughts are persistent. Identification of the best tillage methods to achieve this objective is thus imperative. The integrated effects of conservation tillage on soil micro topography and soil moisture on a sandy loam soil were evaluated. The field experiment consisted of five tillage treatments, namely tied ridging (TR), no till (NT), disc plough (DP), strip catchment tillage (SCT) and hand hoe (HH). Data measured in the field included soil moisture content, surface roughness, infiltration and sorghum grain yield. A depth storage model was used to estimate depression storage TR treatment and the higher the surface roughness, the greater the depression storage volume. Regression analysis showed that random roughness decreased exponentially with increase in cumulative rainfall. Higher moisture contents were associated with treatments having higher depression storage. Infiltration rate was significantly higher in the tilled soils than the untilled soils. The DP treatment had the highest cumulative infiltration while NT had the lowest. The Infiltration model which was fitted to the infiltration data gave good fit. Grain yield was highest in TR and least in NT, whereas DP and HH had similar yields.