

Exploring the Impact of Tillage and Manure on Soil Water Retention and Van Genuchten

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Abstract : A study was conducted to evaluate hydraulic properties of a sandy loam soil and corn (*Zea mays* L.) crop production under a short-term tillage and manure combinations field experiment carried out in west of Iran. Treatments included composted cattle manure application rates [0, 30, and 60 Mg (dry weight) ha⁻¹] and tillage systems [no-tillage (NT), chisel plowing (CP), and moldboard plowing (MP)] arranged in a split-plot design. Soil water characteristic curve (SWCC) and saturated hydraulic conductivity (Ks) were significantly affected by manure and tillage treatments. At any matric suction, the soil water content was in the order of MP>CP>NT. At all matric suctions, the amount of water retained by the soil increased as manure application rate increased (i.e. 60>30>0 Mg ha⁻¹). Similar to the tillage effects, at high suctions the differences of water retained due to manure addition were less than that at low suctions. The change of SWCC from tillage methods and manure applications may attribute to the change of pore size and aggregate size distributions. Soil Ks was in the order of CP>MP>NT for the first two layers and in the order of MP>CP and NT for the deeper soil layer. The Ks also increased with increasing rates of manure application (i.e. 60>30>0 Mg ha⁻¹). This was due to the increase in the total pore size and continuity.

Keywords : corn, manure, saturated hydraulic conductivity, soil water characteristic curve, tillage

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