Geophysical Research Abstracts
Vol. 15, EGU2013-91-1, 2013
EGU General Assembly 2013

Least Limiting Water Range of soils in the Colonia Agrícola de Turen, Venezuela

Maiby Yolanda Perez and Adriana Florentino de Andreu
Faculty of Agronomy, Central University of Venezuela, Maracay, Venezuela Bolivarian Republic of

Soil physical degradation is a major problem affecting the soil quality for crops production in Venezuelan agricultural areas. The least limiting water range (LLWR) is considered a soil physical quality index defined as the range in soil water content within which the limitations to plant response associated with water potential, poor aeration and high mechanical resistance are minimal. The study was carried out to characterize the LLWR and to determine the LLWR response to structural changes on soils of the Colonia Agricola de Turen, Venezuela. The soils were cropped with maize under different tillage systems (no tillage, conventional and conventional - fallow) and non-cropped under native forest. Hundred and seventy undisturbed samples were taken from specific sites under each of the above soil conditions to determine the water retention curve, the soil resistance curve and bulk density. Disturbed samples were also taken from each site to determine particle size and organic matter content. Pedotransfer functions relating the water retention curve and soil resistance curve with particle size distribution, organic matter content and bulk density were developed and use to calculate the LLWR for each site. According to the results, soil physical degradation under conventional tillage and high clay content had the highest negative impact on the LLWR. For this case (silty clay loam soil), the LLWR became narrower due to the lower water content associated with poor aeration and the higher water content associated with high mechanical resistance. In contrast, for non degraded soils with high sand content (sandy loam) the LLWR showed the highest values associated with the water content at field capacity and the water content at permanent wilting point, both the upper and lower critical limits of LLWR. For silty loam and loam soils the LLWR declined with increasing bulk density and clay content associated with water content at field capacity and water content at high mechanical resistance. Soil resistance to root penetration determined the lower limit of LLWR in 41 % of the soils and the water content at field capacity determined the upper limit of LLWR in 94% of the soils. Further studies are recommended to determine the nature and magnitude of the association between the LLWR and crop yield under different soils and climate conditions.