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A RE-SATURATION IMPACT ON SOIL RETENTION CURVE FOR FIVE DIFFERENT TEXTURED SOILS

Hassan Sattar Naji and Alaa Salih Ati

Department of Desertification Combat, College of Agriculture Engineering Sciences, University of Baghdad, Iraq.

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ABSTRACT : Soil water retention curves (SWRCs) are crucial for characterizing soil moisture dynamics and are particularly relevant in the context of irrigation management. A study was carried out to obtain the SWRC, inflection point, S index, pore size distribution curve, macro porosity, and air capacity from samples submitted to saturation and re-saturation processes. Five different-texture disturbed soil samplesSandy Loam, Loam, Sandy Clay Loam, Silt Loam, and Claywere collected. After obtaining SWRC, each air-dried soil sampleswere submitted to particle size distribution and clay dispersed in water analyses to verify the soil lost clay. The experimental design was completely randomized with three replications using two processes of SWRC (saturation and re-saturation). The re-saturation process results in a loss of clay in all samples, causing significant changes in SWRC parameters.

Key words : SWRC, Re-Saturation, soil retention, pore size distribution curve, inflection point.

INTRODUCTION

The graphic representation of relationship functions between soil matric section (ψ) and soil volumetric water content (ψ) is called soil-water characteristic curve (SWCC) or soil water retention curve (SWRC) (da Silva *et al*, 2006; Reichrdt and Timm, 2012; Nazari *et al*, 2018). This relationship is important in describing water behavior (Lucas *et al*, 2011). SWRC assists in determining the available and current water content in soil, as well as other basic variables to achieve a proper irrigation management (Costa *et al*, 2008; Lin, 2012), indicating more suitable agricultural practices (Machado *et al*, 2008). Most of the soil functions depend directly or indirectly on soil water retention and transmission, which explains their importance for soil processes in rhizosphere zone (Kutílek, 2004; Lin *et al*, 2005; Blum, 2006; Lin, 2012; Banwart *et al*, 2013).

The effect of soil structure and texture is considered by changing hydraulic conductivity, water retention, root growth and transmission of the chemicals (Lipiec *et al*, 2003;Al-Musawi et al, 2002; Al – Jubouri, 2009 andAbod and Salman, 2014). Changes in soil structure caused by wetting and drying cycles changes in the structure, density, and water content of soil at soil matric section result in changes in SWRC (Pires*et al*, 2007; Costa *et al*, 2014), this process is one of main factors affecting soilphysical condition. Moreover, changes in SWRC fromprocedures to its obtainment result in overe stimation or underestimation of irrigation water depth to beapplied.

Samples are usually submitted to wetting and drying cycles during the procedure to obtain SWRC, which may cause changes in sample structure and pore size distribution (Pires *et al*, 2011). This procedure underestimates or overestimates pore size causing uncertainty in interpreting its physical indicators (Collis-George, 2012). Drying-wetting cycles led to a variation of microstructure, water content and water retention capacity (Sayem and Kong, 2016). Considering the S index assessment this can cause an increase in the number of large pores (1×10^{-3} 510^{-2}cm), in addition to improve the structure with the increase in the number of wetting and drying cycles (Pires *et al,* 2008).

Thus, the hypothesis of this study that re-saturation process as a result of clay losses in the sample, changes taken place in SWRC, particularly not in the drypart, inflection point, and pore size distribution inSandy Loam, Loam, Sandy Clay Loam, Silt Loam, and Claytextures. This study aimedto obtain, for the five textural classes, the SWRC,S index (Dexter, 2004), and pore sizedistribution curve from samples submitted to re-saturation, as well as from not re-saturated samples of SWRC.

MATERIALS AND METHODS

Five different-texture soil samples were taken from