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Soil moisture changes in two experimental sites in Eastern Spain. Irrigation versus rainfed orchards under organic farming

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Within the Soil Erosion and Degradation Research Group Experimental Stations, soil moisture is being researched as a key factor of the soil hydrology and soil erosion (Cerdà, 1995; Cerda, 1997; Cerdà 1998). This because under semiarid conditions soil moisture content plays a crucial role for agriculture, forest, groundwater recharge and soil chemistry and scientific improvement is of great interest in agriculture, hydrology and soil sciences. Soil moisture has been seeing as the key factor for plant photosynthesis, respiration and transpiration in orchards (Schneider and Childers, 1941) and plant growth (Veihmeyer and Hendrickson, 1950). Moreover, soil moisture determine the root growth and distribution (Levin et al., 1979) and the soil respiration (Velerie and Orchard, 1983).
Water content is expressed as a ratio, ranging from 0 (dry) to the value of soil porosity at saturation (wet). In this study we present 1-year of soil moisture measurements at two experimental sites in the Valencia region, Eastern Spain: one representing rainfed orchard typical from the Mediterranean mountains (El Teularet-Sierra de Enguera), and a second site corresponding to an irrigated orange crop (Alcoleja). The EC-5 soil moisture smart sensor S-SMC-M005 integrated with the field-proven ECH_2O^{TM} Sensor and a 12-bit A/D has been choosen for measuring soil water content providing $\pm$3% accuracy in typical soil conditions. Soil moisture measurements were carried out at 5-minute intervals from January till December 2012. In addition, soil moisture was measured at two depths in each landscape: 2 and 20 cm depth - in order to retrieve a representative vertical cross-section of soil moisture. Readings are provided directly from 0 (dry) to 0.450 m3/m3 (wet) volumetric water content. The soil moisture smart sensor is conected to a HOBO U30 Station - GSM-TCP which also stored 5-minute temperature, relative humidity, dew point, global solar radiation, precipitation, wind speed and wind direction data. These complementary atmospheric measurements will serve to explain the intraannual and vertical variations observed in the soil moisture content in both experimental landscapes. This kind of study is aimed to understand the soil moisture content in two different environments such as irrigated rainfed orchards in a semi-arid region. For instance, these measurements have a direct impact on water availability for crops, plant transpiration and could have practical applications to schedule irrigation. Additionally, soil water content has also implications for erosion processes.

Key Words: Water, Agriculture, Irrigation, Eastern Spain, Citrus.

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