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Analysis of water retention curve as a potential tool in comparing the effect of different soil management in two olive orchard in southern Spain

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Water soil erosion is one of the major concerns in agricultural areas in Southern Spain, and the use of cover crops has been recommended as an alternative to tillage to prevent, or mitigate, soil erosion. This change of soil management implies a progressive modification of soil chemical, biological and physical properties which to date, have been documented by a limited number of studies.

In this communication we describe a methodology based on the modification of the water retention curves of intact cores, present the results obtained in two olive orchards in Southern Spain, and compare them with several chemical and physical properties measured simultaneously in the orchards.

The experimental areas were located in Benacazón and Pedrera, Seville province in Southern Spain, and at each location two experimental plots were established. One of the plots was under traditional tillage management and the other under cover crop soil management. The slope at the plots was 12 and 4% respectively. Soil samples were taken at both plots differentiating between the inter tree areas and the under the olive canopy areas, between two different depths: 0-10 cm and 10-20 cm. These resulted in eight different sampling areas (2x2x2). Samples were taken three year after establishing the experiments.

Water retention curves of soils were obtained as the average of replications per and using the Eijkelkamp Sand and Sand/Kaolin suction tables (0-500 hPa) and a Decagon's WP4-T dewpoint potentiometer (0-300•106 hPa). The latest was used to determine the residual water content. Experimental water retention curves were to two different models: van Genuchten (1980) and Kosugi (1994). Once modeling was done, the slope value of the curves at the inflexion point, proposed by Dexter (2004a, b, c) to estimate physical quality of soils, was calculated.

This study presents and discusses the advantages and problems of the different approaches for determining the water retention curves, the potential of these curves to evaluate physical modifications of the soils, and compares them with the other soil properties measured at the experiments.

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