

Use of Conceptual Water Balance Model to Explore the Impact of Different Soil Management on Water Availability in Olive Groves and Vineyards under Different Climate Conditions

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Olive trees and vines are two of the major tree crops in the Mediterranean region. Both crops present severe soil degradation problems due to accelerated water erosion associated with cultivation on sloping areas, sporadic but intense rainfall events, and management based on bare soil to prevent competition for soil water with the main crop (Gómez et al., 2011). In the last few decades the major soil conservation efforts for both crops have been oriented towards the use of temporary cover crops in the lanes between the tree rows that are mowed or sprayed in the early spring to balance soil conservation with an adequate soil water balance for the major crop. Thus, water balance is a key element for success of soil conservation under semi-arid conditions. Recently several models have been developed to allow evaluation of these two crops under different soil management and climate conditions, including the WABOL model (Figure 1) for olives (Abazi et al., 2012) and the VERDI model for vineyards (Ripoche et al., 2011).

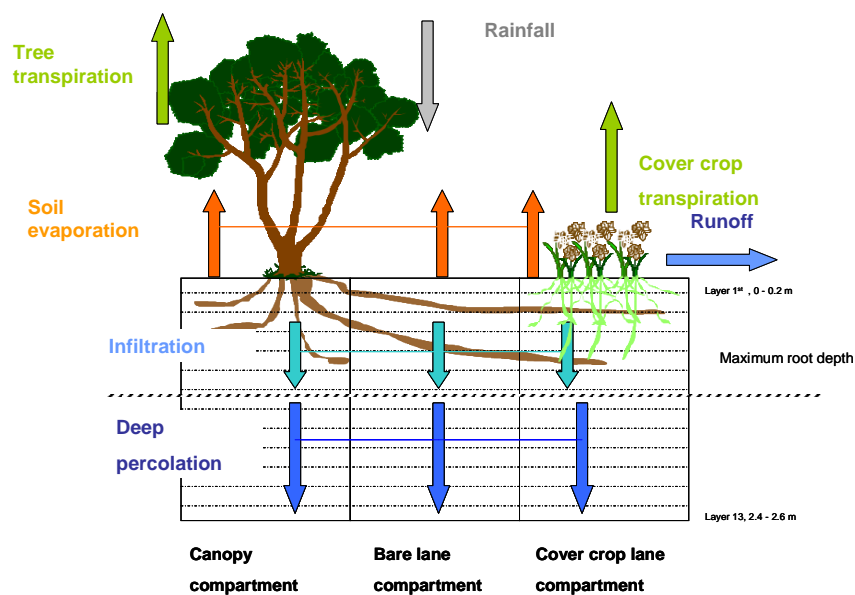


Figure 1. Conceptual description of the olive orchard by the WABOL model (Abazi et al., 2012).

Here we present results from current studies on application of WABOL and WABYN (Gómez et al., 2016), that were designed for evaluating the impact on water balance of different soil management strategies with a minimum expertise on model execution by the users. For this purpose both models are programmed in FORTRAN and compiled as a dynamic linking library to be executed from an interface in Microsoft Excel.

In addition to a description of both models, calibration sources, current status and major research questions raised by this analysis, we will present the results of an analysis performed with WABOL addressing potential climate change impacts. We evaluated the effect of different soil, orchard typology, management and climate conditions on the different components of the water balance (Figure 2), as well as their variations under predicted climate conditions to the end of the 21st century in some olive growing areas in southern Spain. Additionally, the current status of

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preliminary evaluations of soil management in vineyards under different climate conditions in southern Spain will be presented.

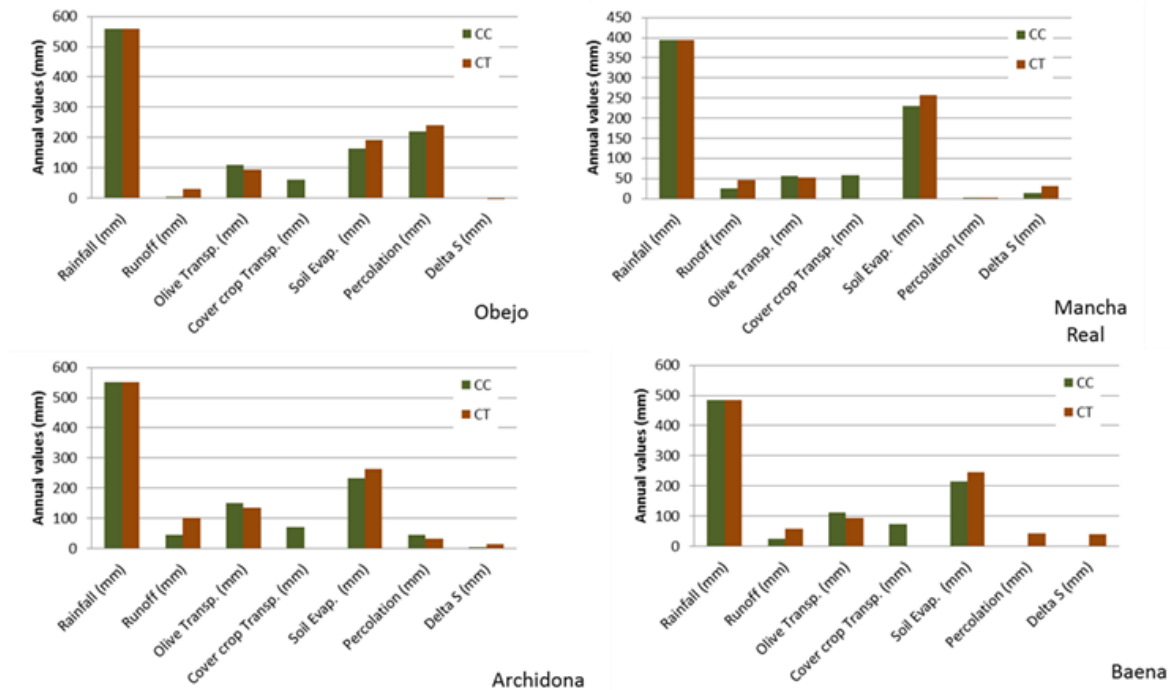


Figure 2. Average values of the components of the soil water balance for four locations in Andalusia (southern Spain) and two different soil managements (cover crops, CC; conventional tillage, CT) during the period 1971-2000. Adapted from Gómez et al. (2014).

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