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Innovative topography-based techniques of soil and water retention for intensive and hedgerow olive orchards: a preliminary experimental study

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Intensive and hedgerow olive orchards are expanding worldwide in irrigated and rainfed areas because of the high yield and early production and the reduction of production cost associated thanks to full mechanization particularly in harvesting and pruning operations (Barranco et al., 2017). Intensive and hedgerow orchards have high water consumption while high risk of erosion is expected when they are established in gentle to steep slopes with reduced soil cover (García-Ruiz, 2010). In this context, micro catchment rainwater harvesting (MCRH) and conservation methods are useful to protect the soil and increase soil water availability.

The objective of this study is to design an experiment to evaluate the sediment trapping capacity of innovative and low cost measures. The experiment should provide practical information about durability and guidelines for implementation in the field. The experiment consists of evaluating the behaviour of "linear structures" interrupting the hillslope, for hedgerow orchards; and individual "half moons" around the trees for intensive olive orchards. The material examined will be i) stones and ii) artificial barriers made with industrial vegetal residues (Bermejo, 2016; Albert et al., 2018). The features to be evaluated at the end of the year will be: trapped sediment, durability and conservation of the measures, growth and vigour of the trees.

The experiment will be implemented in existing olive orchards (intensive and hedgerow, respectively) in the Campus of Rabanales of the University of Cordoba (Spain), where daily precipitation, evapotranspiration and temperature are currently monitored. Firstly, three pairs of mini-catchments have been chosen for each type of orchard with similar characteristics in terms slope, aspect, drainage area and type of soil. Trapped sediment is expected to be measured through laser scanner in the beginning of the experiment and at the end of each annual campaign; whereas trees vigour will be measuring leaf area and olive yield comparing with trees located in control mini-catchments. Rainfall events and evapotranspiration values will be described to characterize the functionality of the linear infrastructures and half moons, taking into account compatibility with the management and deterioration of the different structures. In addition to the experimental results, it is expected to learn how to parameterise and to model the impact of the studied measures in different olive orchards as well as providing design improvement.

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