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A runoff irrigated olive orchard with trees planted in trenches

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Olive trees are planted at extremely low densities in orchards located in arid and semi-arid regions in order to ensure a reasonable volume of water for each tree. Due to the frequency of events with low rainfall depths rainwater will not penetrate deeply and because a large fraction of the soil surface is bare, evaporate directly into the atmosphere. In addition the roots may not efficiently explore the wetted area. It is therefore likely that olive growing is under these conditions is wasteful in terms of land and water use. The situation can be improved if direct evaporative losses are minimized and water is stored in the soil profile relatively close to the trunk. We tested the agronomic and economic feasibility of establishing, in an area with an annual precipitation of 100 mm, an olive orchard in which the trees are planted in shallow trenches and supplied with runoff water harvested from the area between the trenches. The dimensions of the trenches were such that the highest level of the water collected was 0.3 m below the soil surface for the highest rainfall event.

We measured the evaporation of water from pans located in the bottom of various configurations of trenches (orientation and depth to width ratio) without the presence of trees. The results indicated that depending on the width to depth ratio and the geographical alignment of the trenches evaporation from free water surfaces can be reduced by up to 40%.

In the planted trenches we monitored tree development and the movement of water in the soil profile in the trench itself and at various distances from it.

The results obtained indicate that the evaporation of water has been considerably reduced and that the trees have transpired this additional water.