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A water balance field study of a contour plot runoff -water harvesting system in an arid region.

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Afforestation in arid regions usually requires the addition of water, particularly during the early stages of development. One of the most environmentally friendly and energy saving procedures is to so by harvesting runoff water. Our objective was to determine the relative effects of: solar radiation , rainstorm characteristics, soil properties and internal drainage on the soil water budget.
The research site is located in a semi-arid region with mediterranean climate (winter rainfall with average annual precipitation of 250 mm), within a contour ridge water harvesting system planted with a variety of sapling species. The soil is a loess, whose depth varies as function of distance from the ridge of the slope and the orientation of the latter.
During the four-year project, rainfall and soil water contents were systematically measured during the winter rainy seasons. Soil water content was monitored using a field calibrated neutron probe at 0.15 m intervals down to the soil rock interface. The collected data was used in order to determine water gains (rainfall & runoff) and losses (evapotranspiration and internal water drainage) within the soil root zone.
The rainstorm amounts and their temporal distribution during the rainy season determine the water inputs, but the efficiency of the system to hold the harvested water inputs is mainly controlled by the water retention characteristics of the soil and its depth. Both parameters were strongly affected by the orientation of the slope.
A physical infiltration model (Green & Ampt) was used to calculate the effective runoff coefficient for the site, and we developed a procedure for the planning of contour ridge systems based on the aforementioned model and on the analysis of the collected data.