



Spatial and temporal variation of soil water store and overland flow in a farmed semiarid water harvesting catchment

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One of the major challenges for the hydrology and crop production in semiarid farmed catchments with water harvesting structure at their outlets is the assessment of the rainfall partitioning between the reservoir and the soil water store. The main objective of this study was to analyse the influence of heterogeneous land use on the spatial and temporal variation of this rainfall partitioning within a typical farmed catchment in the northeast of Tunisia. The studied catchment has an area of 2.6 km² and comprises at its outlet dam, which retains the runoff water in a reservoir. Overland flow and soil water store evolution were monitored during two cropping cycles on a network of 11 plots of 2 m² each with different land use and soil characteristics.

The observed data showed a very large temporal and spatial variability of soil water storage and overland flow within the catchment. For example, during the 2001-2002 season the lowest observed amount of overland flow was 7.5 mm for 362 mm of rainfall under chickpeas on a clayey soil and the largest was 41 mm for 290 mm of rainfall under perennial shrubs on a sandy soil. The spatial distribution of overland flow could be related by a general linear regression approach to rainfall amount, initial soil moisture and soil infiltrability class defined from the soil surface conditions. The seasonal

evolution of soil water storage was closely linked to the rainfall regime but also to the evapotranspiration fluxes that varied spatially according to the different cropping cycles of each type of land use. This led to maximal values of soil water store that were twice as large than the minimal values at a given time.

These experimental results indicate that the variation in land use in a semi-arid catchment is a main factor of variation in soil water store and rainfall partition between overland flow and infiltration. Therefore, to predict the water harvesting capacities of a farmed catchment in semi-arid areas it seems essential to consider precisely its land use and its temporal evolution. .