



Curve numbers for olive orchard catchments in Spain

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The Curve Number (CN) method (Soil Conservation Service, 1972) is widely applied around the world to estimate direct runoff and the corresponding hydrograph of a rainfall event. Its efficient and simple computation, its complete parameterization for different soils, uses and managements and its good performance justify its application. Nevertheless, apart from Romero et al. (2007) who calculated CN-values at the plot scale, there is little information on the model performance in olive orchards at the catchment scale.

In this work, the CN-model has been applied in three small catchments in Spain ranging between 6 and 8 ha with different soil types (regosol, luvisol and vertisol), topography (mean slopes between 9-15%) and management practices (non-tillage with a spontaneous grass cover, minimum tillage, conventional tillage). A rainfall-runoff dataset of 6 years have been used to test the usefulness of model as well as the accuracy of its reference parameterization (CNs and of initial subtraction, I_a). CN-values were adjusted, optimized and compared with reference values for orchard crops while the sensitivity of the goodness of fit to I_a was described for each catchment.

Classical equations based on the use of CN-percentiles 50, 10 and 90 for determining the antecedent moisture content (AMC) provided very good results with Nash-Sutcliffe coefficients of efficiency equal to 0.73 and 0.81 in two of the catchments with an annual rainfall higher than 600 mm. The third one -with an annual rainfall lower than 400 mm and spontaneous grass cover- showed a different pattern where a multiple linear regression dependant on precipitation and temperature features, represented notably better the rainfall-runoff relationships. Although fractions of I_a on the storage (S) equal to 0.15 and 0.25 allowed to optimize the adjustments of CN, the usual reference of 0.20 is quite appropriate. Finally, significant deviations were observed on reference-CN's for sandy soils that should be considered for hydrological calculations in olive orchard catchments.

REFERENCES

P. Romero, G. Castro, J.A. Gómez and E. Fereres. 2007. Curve Number Values for Olive Orchards under Different Soil Managemen. Soil Scicence Society of America Journal. Vol. 71 No. 6, p. 1758-1769
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