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Forty years experience in developing and using rainfall simulators under tropical and Mediterranean conditions

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Rainfall simulation has been used as a practical tool for evaluating the interaction of falling water drops on the soil surface, to measure both stability of soil aggregates to drop impact and water infiltration rates. In both cases it is tried to simulate the effects of natural rainfall, which usually occurs at very different, variable and erratic rates and intensities. One of the main arguments against the use of rainfall simulators is the difficulty to reproduce the size, final velocity and kinetic energy of the drops in natural rainfall.
Since the early 70´s we have been developing and using different kinds of rainfall simulators, both at laboratory and field levels, and under tropical and Mediterranean soil and climate conditions, in flat and sloping lands. They have been mainly used to evaluate the relative effects of different land use and management, including different cropping systems, tillage practices, surface soil conditioning, surface covers, etc. on soil water infiltration, on runoff and on erosion. Our experience is that in any case it is impossible to reproduce the variable size distribution and terminal velocity of raindrops, and the variable changes in intensity of natural storms, under a particular climate condition. In spite of this, with the use of rainfall simulators it is possible to obtain very good information, which if it is properly interpreted in relation to each particular condition (land and crop management, rainfall characteristics, measurement conditions, etc.) may be used as one of the parameters for deducing and modelling soil water balance and soil moisture regime under different land use and management and variable climate conditions. Due to the possibility for a better control of the intensity of simulated rainfall and of the size of water drops, and the possibility to make more repeated measurements under very variable soil and land conditions, both in the laboratory and specially in the field, the better results have been obtained with small size 500-1000 cm2, easily dismantled, drop former simulators, than with larger, nozzle, or more sophisticated equipments. In this contribution there are presented some of the rainfall simulators developed and used by the main author, and some of the results obtained in different studies of practical problems under tropical and Mediterranean conditions.

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