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CALIBRATION OF THREE RAINFALL SIMULATORS WITH AUTOMATIC MEASUREMENT METHODS
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The rainfall erosivity is the potential ability of rain to cause erosion. It is function of the physical characteristics of rainfall (Hudson, 1971). Most expressions describing erosivity are related to kinetic energy or momentum and so with drop mass or size and fall velocity. Therefore, research on factors determining erosivity leds to the necessity to study the relation between fall height and fall velocity for different drop sizes, generated in a rainfall simulator (Epema G.F.and Riezebos H.Th, 1983)
Rainfall simulators are one of the most used tools for erosion studies and are used to determine fall velocity and drop size. Rainfall simulators allow repeated and multiple measurements
The main reason for use of rainfall simulation as a research tool is to reproduce in a controlled way the behaviour expected in the natural environment. But in many occasions when simulated rain is used in order to compare it with natural rain, there is a lack of correspondence between natural and simulated rain and this can introduce some doubt about validity of data because the characteristics of natural rain are not adequately represented in rainfall simulation research (Dunkerley D., 2008).
Many times the rainfall simulations have high rain rates and they do not resemble natural rain events and these measures are not comparables. And besides the intensity is related to the kinetic energy which determines the rainfall erosivity (Dunkerley D., 2008).
A special attention must be paid to the experimental design and the understanding of the measurements obtained.
The objective of this study is the calibration of simulated rain. In order to achieve this objective a rainfall simulator and disdrometer have been used. The first one is a nozzle type and its sprinkler system was located at different heights, three different spray nozzles supplied the water with known pressure. The simulated rainfall presented different intensities, drop diameters distribution and so different kinetic energy.
The instrument of measurement for registering data is the disdrometer (Joss and Waldvogel, 1967) which provides the total number of impacts of raindrops, minute after minute, grouped in 20 classes according to their size which allows the real time measurements of the drop diameter distributions, kinetic energy per minute and intensity per minute. Disdrometer registers data in supposing drops fall down with terminal velocity but this velocity can reach up to 7-9 m of height in natural raindrop, depending on drop diameters.
If the height of simulator is high enough the drops could recuperate their terminal velocities and their kinetic energies could be true. The nozzles were located to different heights in order to achieve these terminal velocities. These heights vary depending on the nozzles used, when the drops supplied by the nozzle are smaller the terminal velocity is reached sooner than when the drops are bigger. The physical characteristics of simulated rainfall in the three nozzles, intensity, drop diameter distributions and kinetic energy, are known and steady when the drops supplied by the nozzles reach terminal velocities.