

Rainfall erosivity in south-central Nigeria

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Abstract

Rainfall data collected from 1986 to 1990 at Okomu ($6^{\circ} 25'N$; $5^{\circ} 12'E$; 76 m above mean sea level), a humid forest area near Benin City, southern Nigeria, were used to evaluate erosivity characteristics. The average annual rainfall was 2048 mm and the distribution pattern was unimodal. 49% of rainfall amount fell at 7.5-minute intensities exceeding 25 mm/h. A maximum 7.5-minute intensity of 240 mm/h was observed at the site. The median rain drop size (D50) was 2.3 mm. The mean monthly kinetic energy, using the Wischmeier and Smith (1978) recommended procedure, ranged from 1.5 to 87 MJ/ha; whereas the values ranged from 1.5 to 140 MJ/ha using the Kowal and Kassam (1976) equation. These results suggest that equations developed in the tropics would estimate kinetic energy higher than those developed in the temperate regions. The annual value of erosivity was 18510 MJ·mm/ha·h by the EI30index, 216 MJ/ha by the $KE \geq 25$ mm/h index and 1329 cm²/h by the Alm index. The study indicates that rainfall of small and large amounts are capable of causing soil erosion at the site because they often fall at erosive intensities and contain big drops. The complementary role of the small- and large-amount storms made the cumulative erosivity of the rains at the study site very high. The information provided in this study shall be useful in estimating the erosive nature of rain in similar environments and will augment other available information in drawing an iso-erodent map for Nigeria. Furthermore, the erosivity factor for soil loss estimation on monthly basis in the area of study can be quantified by selecting the appropriate index values for soil loss equations.

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