

Influence of Antecedent Soil Moisture on Soil Erosion: A Two-Year Field Study

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Abstract : The relationship between antecedent soil moisture content and soil erosion is a complicated phenomenon. Some studies confirm the effect of antecedent soil moisture content on soil erosion, but some deny it. Therefore, the objective of this study is to clarify such contradictions through field experiments. This study conducted two-year field observations of soil losses from natural rainfall events on runoff plots with a length of 10 meters, width of 3 meters, and uniform slope of 9%. Volumetric soil moisture sensors were used to log the soil moisture changes for each rainfall event. A total of 49 effective events were monitored. Results of this study show that antecedent soil moisture content promotes the generation of surface runoff, especially for rainfall events with short duration or lower magnitudes. A positive correlation was found between antecedent soil moisture content and soil loss per unit Rainfall-Runoff Erosivity Index, which indicated that soil with high moisture content is more susceptible to detachment. Once the rainfall duration exceeds 10 hours, the impact from the rainfall duration to soil erosion overwrites, and the effect of antecedent soil moisture is almost negligible.

Keywords : antecedent soil moisture content, soil loss, runoff coefficient, rainfall-runoff erosivity

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