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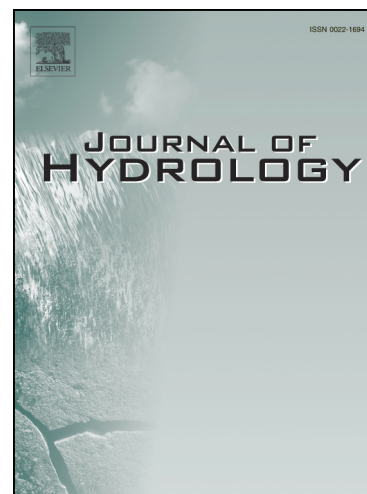
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Comparison of Loess and Purple Rill Erosions Measured with Volume Replacement Method

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Abstract: Rills are commonly found on sloping farm fields in both the loess and the purple soil regions of China. A comparative study on rill erosion between the two soils is important to increase research knowledge and exchange application experiences. Rill erosion processes of loess and purple soils were determined through laboratory experiments with the volume replacement method. Water was used to refill the eroded rill segments to compute eroded volume before sediment concentration distribution along the rill was computed using the soil bulk density, flow rate, and water flow duration. The experimental loess soil materials were from the Loess Plateau and purple soil from the southwestern part of China, Chongqing City. A laboratory experimental platform was used to construct flumes to simulate rills with 12.0 m length, 0.1 m width, and 0.3 m depth. Soil materials were filled into the flumes at a bulk density of 1.2 g cm^{-3} to a depth of 20 cm to form rills for experiments on five slope gradients (5° , 10° , 15° , 20° , and 25°) and three flow rates (2, 4, and 8 L/min). After each experimental run under the given slope gradient and flow rate, the rill segments from the upper slope between 0–0.5, 0.5–1, 1–2, 2–3, ..., 7–8, 8–10, and 10–12 m were lined with plastic sheets before be re-filled with water to determine sediment concentration after the eroded volumes was measured. Rill erosion differed between the two soils. As purple soil started to erode at a higher erosive force than loess soil, it possibly exhibits higher resistance to water erosion. The subsequent erosion process in the eroding purple rill was similar to that in the loess rill. However, the total erosion in the eroding loess rill was more than that in the eroding purple rill. The maximum sediment concentration transported by the eroding purple rills was significantly lower, approximately 55% of those transported by the loess rills under the same

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