

Effects of Plant on Gravity Erosion on the Gully Sidewall under the Intense Rainfall

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To study the mechanism of vegetation on gravity erosion may provide the theoretical basis for the design of soil and water conservation on the Loess Plateau, China. This study explores the effects of vegetation on the gravity erosion using the models of loess gully sidewall with the slope degree of 70° and height of 1.5 m under series of rainfall simulations, in which vegetational and bare lands were used, respectively. The experimental results are shown as follows: (1) The influence of the vegetation on the total amount of gravity erosion may be ignored. The average amount of gravity erosion for each event of rainfall on the vegetational sidewall was only decreased by 15% compared with that on the bare sidewall. (2) The vegetation on the gully sidewall had different influences on the varied types of gravity erosion. Compared with those on the bare land, the average amounts of the avalanche and mudslide on the vegetational slope was decreased by 58% and 69%, respectively. In the meantime, the average amount of landslide in the vegetational slope was increased by 153% compared with that in bare slope. (3) The plant had a certain effect on the mass failures after rainfalls. The ratio of the failure mass volume after rainfall to the total on the vegetational slope was almost 13%, while the ratio on the bare slope was only 1%. (4) The effects of vegetation on gravity erosion were caused by several factors. The plant roots may reinforce the soil and reduce the amount of gravity erosion, but the self-gravity of the plant might increase the gravity erosion. In addition, the soil permeability was increased by the plant roots, which could intensify the landslide. As a result, the plant practice was preferable for the sidewall vulnerable to mudslide. The results may be referred to analyze the mechanism of gravity erosion.