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How do shrubs impact the mass failures on the loess sidewall?

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The effects of plants on gravity erosion are still controversial, although vegetation has been widely used in soil and water conservation. In order to evaluate the influence of vegetation on gravity erosion, a series of laboratory experiments was performed on a 1.5-m-high loess-gully sidewall with a 70° slope, involving two types of shrubland (SL model) and bare land (BL model). The results revealed only an 8–20% decrease in total gravity erosion in the SL model compared to the corresponding BL model, which indicated that the impact of vegetation on gravity erosion is not significant. Compared with the BL model, the average landslide volume was 42% greater in the SL model, while the average avalanche and mudslide volumes in the SL model were 50% and 36% less, respectively. In addition, vegetation can change the type of gravity erosion and improve the degree of soil fragmentation. The amount of erosion after rain in the SL model was $33.17 \times 10^3 \text{ cm}^3$ more than that in the BL model. Compared with the anchoring effect of vegetation, the change of soil water caused by vegetation on the slope has a greater effect on the gravity erosion under heavy rains. It is suggested that the shrub restoration measures can be used in the areas with frequent debris flow and hydraulic erosion, and structural measures may reduce the negative impact of plants on gravity erosion of the Loess Plateau.