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Effect of soil moisture content on soil erodibility and critical shear stress

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Antecedent soil moisture content exerts a complex, perhaps controversial effect on soil erodibility and critical shear stress. The soil erodibility and critical shear stress for the Cinnamon and Brown soil representing two differently textured soils, a coarse-grained soil and a fine-grained soil respectively, were measured using hydraulic flume for six different moisture content conditions (i.e. 3, 6, 9, 12, 15, 18%). Soil samples were subjected to scour under nine different combinations of three slopes gradient (i.e. 5, 10, 15°) and three flow discharge (8, 12, 16 L/min). The results showed that moisture content had obvious effect on soil erodibility and critical shear stress for both fine-grained soil and coarse-grained soil. As moisture content increased, soil erodibility for the fine-grained soil increased firstly and then decreased, while for coarse-grained soil, the soil erodibility decreased. Critical shear stress decreased firstly and then increased for the fine-grained soil, while for coarse-grained soil, critical shear stress showed a decreased trend. However, the difference of critical shear stress and soil erodibility between the fine-rained soil and coarse-grained soil were not significant at $p = 0.05$. The relationship between soil erodibility and critical shear stress for the coarse-grained soil could be modeled by a power function, but for the fine-grained soil the relationship could be modeled by polynomial function. Future work will include additional soil textures to understand the influence of soil water content on soil erosion.