

Multi-level systematic analysis of sheet erosion mechanism on steep slopes covered by grass

Dongdong Wang¹

¹College of Resources, Environment and Planning, Dezhou University

June 29, 2020

Abstract

The erosion mechanism on steep grass slopes is the basis and difficulty of grassland erosion model, but few related studies. The erosion mechanism on steep slopes covered by grass was studied by artificial rainfall experiments. Results showed the following: (1) The contributions of the $R\omega$ (reduction of stream power) and RK (reduction of soil erodibility) to the decreasing erosion modulus (REM) are 61.02% and 33.55%, respectively, totalling to 94.57%. This finding indicates that herbaceous vegetation decreases the interrill erosion mainly by decreasing the stream power. (2) The relationship between the $R\omega$ and grass cover, and phytal cover can be described with logarithmic equations. The calculation under different rainfall intensities or slopes showed contribution rates of 82.86%-97.51% or 86.36%-97.51%, and 1.48%-14.82% or 1.48%-20.44%. (3) The relationship between the RK and root volume (RV), and soil bulk density (SD) can be described with binary logarithmic equations. The calculation showed contribution rates of 73.61%-97.94, and 0.04%-0.22%. (4) In-depth analysis found the regulation effect of grass on stream power is mainly achieved by grass cover, and the regulation effect of grass on soil erodibility is mainly achieved by root volume. The research focus should be on the impact of vegetation layout, vegetation types, vegetation density, and soil properties on soil erosion under large-scale conditions.

Hosted file

Highlights \begin{CJK}{UTF8}{gbsn}.\end{CJK}\selectlanguage{english}doc available at <https://authorea.com/users/333569/articles/463504-multi-level-systematic-analysis-of-sheet-erosion-mechanism-on-steep-slopes-covered-by-grass>

Hosted file

\begin{CJK}{UTF8}{gbsn}\end{CJK}\selectlanguage{english}Mechanism777\begin{CJK}{UTF8}{gbsn}.\end{CJK}\selectlanguage{english}doc available at <https://authorea.com/users/333569/articles/463504-multi-level-systematic-analysis-of-sheet-erosion-mechanism-on-steep-slopes-covered-by-grass>

Hosted file

Tables \begin{CJK}{UTF8}{gbsn}.\end{CJK}\selectlanguage{english}doc available at <https://authorea.com/users/333569/articles/463504-multi-level-systematic-analysis-of-sheet-erosion-mechanism-on-steep-slopes-covered-by-grass>