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A. Reszkowska

Christian-Albrechts-University, Germany

J. Krümmelbein

Brandenburg University of Technology Cottbus, Germany

S. Peth

Christian-Albrechts-University, Germany

L. Gan

Hunan Normal University, China

X. Peng

Chinese Academy of Sciences, China

See next page for additional authors

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Presenter Information

A. Reszkowska, J. Krümmelbein, S. Peth, L. Gan, X. Peng, and R. Horn

Effect of grazing on soil structure and consequences for soil mechanical and hydraulic properties in Inner Mongolia

A .Reszkowska¹ , J .Krümmelbein² , S .Peth¹ , L .Gan³ , Xh .Peng⁴ and R . Horn¹

¹Institute of Plant Nutrition and Soil Science , Faculty of Agriculture and Nutritional Science , Christian-Albrechts-University , Hermann-Rodewald-Str . 2 , 24118 Kiel , Germany , E-mail : a .reszkowska@soils .uni-kiel-de , ²Brandenburg University of Technology Cottbus , Faculty of Environmental Sciences and Process Engineering , Konrad-Wachsmann-Allee 6 , 03046 Cottbus , Germany ³College of Resources and Environment , Hunan Normal University , 410081 Changsha , Hunan , China , ⁴Institute of Soil Science , Chinese Academy of Sciences , East Beijing Road 71 , 210008 Nanjing , China

Key words : grazing intensity , soil structure , hydraulic and mechanical properties

Introduction Animal trampling can strongly affect soil physical properties . Destruction of soil structure caused by animals leads to increase in soil bulk density followed by an increase in surface runoff . Grazing can cause changes in pore functions which affect the hydraulic properties of the soil . Stresses exerted by trampling can also lead to changes in soil mechanical strength . The soil physical properties can be affected much more when considering arid climate conditions . The objective of this study was to investigate how the animal trampling can affect soil physical (hydraulic and mechanical) properties in an Inner Mongolia grassland ecosystem with different grazing intensity , with different moisture conditions .

Materials and methods The effect of trampling by sheep and goats on physical (hydraulic and mechanical) properties of grassland soils on the steppe in Inner Mongolia , was investigated . The samples were collected from two different steppe ecosystems (*Leymus chinensis* steppe and *Stipa grandis* steppe) . The samples were taken from sites with different grazing intensities : ungrazed since 1979 (UG79) , ungrazed since 1999 (UG99) , winter grazed (WG) and overgrazed (OG) at the *Leymus chinensis* site and ungrazed since 1979 (SG UG79) and continuously grazed (SG CG) at the *Stipa grandis* site . The studied soils were derived from aeolian sediments above acid volcanic rocks . From each site soil samples , for measurements of soil hydraulic and mechanical properties , were taken .

Results The soil hydraulic functions and soil mechanical properties were affected by grazing . It was found especially for the top soil . The animal trampling caused a decrease in soil total porosity and an increase in soil bulk density . The saturated hydraulic conductivity was lower for the grazed sites compared to ungrazed sites . Grazing caused a reorganization of soil particles which resulted in decreased soil air permeability . Furthermore , animal trampling affected soil sensitivity and intensity of shrinkage . Grazing also affected soil mechanical properties by changing the precompression stress values which were higher for the grazed sites compared to ungrazed .

Conclusions The results show that grazing can strongly affect soil physical (hydraulic and mechanical) properties . Animal trampling causes soil structure deterioration , especially in the top layer of the soil . Changes in soil structure due to grazing affect soil functions as well as plant productivity .

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