Effect of Grazing Gradients on Soil Microbe Variation in Inner Mongolia Steppe

Xiaoyu Wang
Inner Mongolia Agricultural University, China

Mengli Zhao
Inner Mongolia Agricultural University, China

Guodong Han
Inner Mongolia Agricultural University, China

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Effect of grazing gradients on soil microbe variation in Inner Mongolia steppe

Xiaoyu Wang , Mengli Zhao , and Guodong Han
College of Ecology and Environmental Science , Inner Mongolia Agricultural University , Hohhot ,010018 , China . E-mail : wxy1982905@yahoo .com

Key words : typical steppe , livestock grazing , grazing intensity

Introduction Soil microbes are very important parts in grassland ecosystem . It forms a powerful dynamical resources store and plays a key role in plant residues decomposition , humus formation and nutrients transition and cycle . Numerous studies have suggested that grazing by livestock will influence soil physical and chemical qualities on grassland while soil microbe will promote nutrients transition under reasonable grazing density . we detected the variation of soil microbes .

Material and methods The site is located in Chifeng Dalinor National Natural Reserve of Inner Mongolia(116°38′～116°41′N , 43°25′～43° 27′ E) . Annual average temperature is 1～2 ℃ ,annual accumulate temperature over 10℃ is 1300～1700℃ . Vegetation type is *Leymus chinensis*+ *Stipa grandis*+ *Cleistogenes squarrosa* and dark chestnut soil . Four grazing gradients arranged from heavy grazing (HG) , moderate grazing (MG) , light grazing (LG) and no grazing (CK) . Soil samples for microbe analysis were collected to a depth of 20 cm by an auger of 8cm diameter and divided into three sections (0-5cm , 5-10 cm , 10-20 cm) . Three replicates in each grazing gradients and five points mixed . Soil microbe data in the study is the total number of three sections . Soil samples collecting for soil moisture , PH and bulk density is also divided in three sections just like the method of soil microbe . Statistical analysis was done by SPSS 15 .0 .

Results The trend of Bacillus was HG>MG>LG>CK and there were no significant differences among grazing gradients(Table 1) .

Table 1 *Soil microbe variation (cfu / g dry soil) .*

Grazing gradients	Bacteria ($\times10^6$)	Bacillus ($\times10^6$)	Mold ($\times10^4$)	Actinomyces ($\times10^6$)	Bacterium of nitrogen fixation($\times10^6$)
HG	4 .70±2 .04ba	2 .22±1 .18a	0 .83±0 .32a	3 .55±1 .23a	0 .87±0 .36ba
MG	4 .23±0 .70ba	1 .63±0 .64a	0 .66±0 .06a	3 .13±0 .43a	0 .86±0 .28ba
LG	7 .63±3 .81a	1 .56±1 .01a	1 .13±0 .44a	5 .16±0 .71a	1 .22±0 .27a
CK	2 .23±0 .32b	0 .64±0 .61a	0 .96±0 .28a	4 .77±1 .81a	0 .64±0 .08b

The same or different letters mean no significance or significant between different grazing gradients ($P< 0.05$)

Bacteria , bacillus , bacterium of nitrogen fixation are negatively correlated with soil moisture . Mold and Actinomyces are positively correlated with soil moisture . Mold and Actinomyces are positively correlated with soil pH(Table 2) .

Table 2 *Correlations between soil indicators and different microbial groups .*

Soil indicators	Bacterial	Bacillus	Mold	Actinomyces	Bacterium of nitrogen fixation
Soil moisture	-0 .352	-0 .498	0 .583*	0 .366	-0 .438
PH	0 .179	0 .044	0 .545	0 .467	-0 .243
Bulk density	-0 .081	-0 .297	0 .188	0 .051	0 .604*

Significant correlation on 0 .05 level .

Conclusions Grassland utilization will affect soil microbes . The variance of soil microbes in different grazing gradients is obviously . Soil microbe will decrease when grazing density increased . Soil microbial groups in LG are higher than that of other three gradients except Bacillus group . This result suggests that reasonable grazing density will increase microbial quantity . Soil environmental factors are positively or negatively affect soil microbial quantity . All the five microbial groups will affect by soil moisture . Mold and Becillus are mainly affected by soil pH . Bacterium of nitrogen fixation has a close relation to soil bulk density .

References

Liao Y N , Zhang G Z , Zhao J . The microbial characteristics of decomposing on plant material of *Aneurolepidium Chinese* and *stipa grandis* in different phonological periods in steppe . *Research on grassland ecosystem* (No .4) , Beijing : Science press , 1992 . 151-158 .

Guo G X , Zhu T C . Study on numbers and biomass of soil microorganism in *Aneurolepidium* Chinese Grassland . *Acta Ecologica Scinica* , 1997 , 17 (1) : 78-82 .

Yao T , Yang J X , Jing Y , *et al* . Population and ecological characteristics of soil fungi in larch plantation on Qinling mountains . *Chinese Journal of Ecology* , 1998 , 17(4) :7-13 .