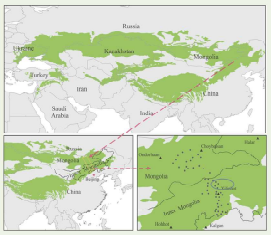
3rd GLOBLE SOIL BIODIVERSITY

GRAZING: A DOUBLE-EDGED SWORD



We analyzed changes in soil biota communities and the soil-micro-food-web, as well as the relationships between aboveground and belowground during degradation caused by over-grazing of grasslands of Inner Mongolia, China. Moderate grazing promoted the soil biota community's diversity, while intensive grazing not only reduced diversity but also simplified the interaction among soil microorganisms. These results highlight the importance of implementing sustainable grazing practices to maintain healthy soil ecosystems in grassland environments.

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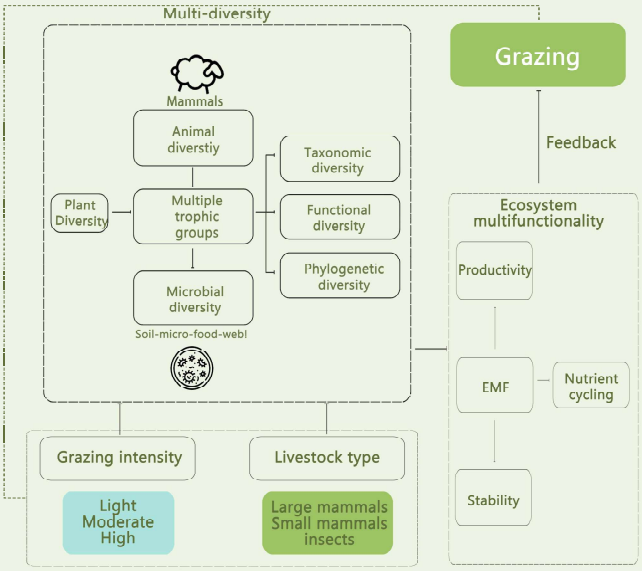
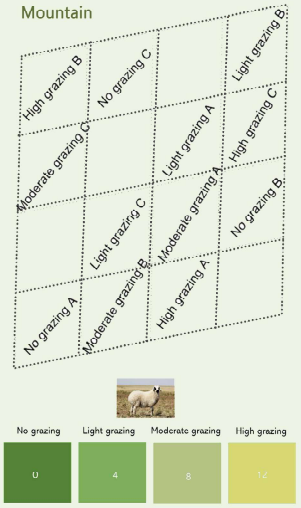
· INTRODUCTION

Mongolia steppe, as a part of the Eurasian steppe, supports 10 million people and 120 million heads of livestock, but suffers from degradation caused by overgrazing.

Grazing impacts the grassland by influencing the grassland multi-diversity via grazing intensity and livestock type, and further affects grassland multifunctionality as a feedback to grazing.

Soil-micro-food-web contributes to the decomposition of soil organic matter and soil C and N mineralization, which can affect the grassland multifunctionality.





· EXPERIMENT

Experiment design:

The experiment was established in 2014 with four grazing treatments in triplicate: No grazing', 'Light grazing' with 4 sheep per plot, 'Moderate grazing' with 8 sheep per plot and 'High grazing' with 12 sheep. Each plot was 1.33 ha.

Samples taken:

Five random soil cores were pooled for chemical analysis and per plot three soil samples were taken to assess the soil microbe communities.

· RESULT

Community diversity:

The species richness of fungi and nematodes communities was highest under light and moderate grazing intensity treatments, and significantly decreased as grazing intensity increased.

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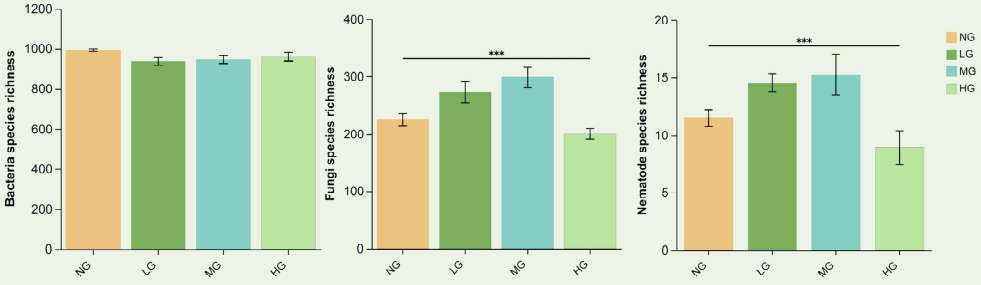
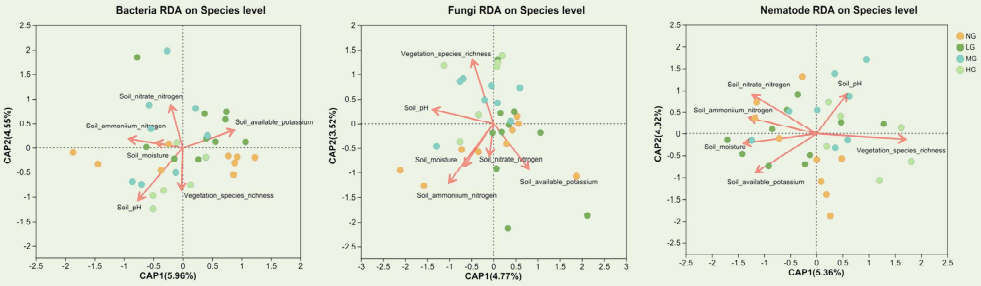
Environment interaction:

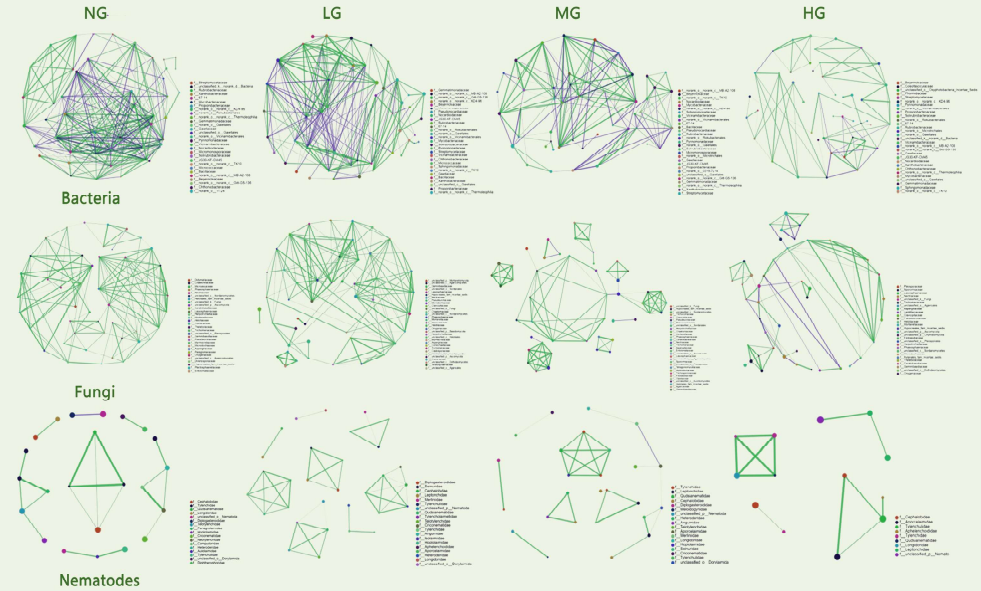
The soil pH had significant impact on the soil microorganisms' communities. Fungi and nematodes communities were sensitive to vegetation species richness as well.

Community networking:

The networking figure showed nodes representing different species within the communities, with the thickness of the lines indicating interaction strength. Grazing simplified the soil microorganism's community's interaction at species level. The negative interactions among communities of fungi increased as the grazing intensity increased. Conversely, the bacteria community showed a decrease in both positive and negative interactions under intensive grazing. In comparison, the species networks of nematodes were less complicated than those of bacteria and fungi.







· DISCUSSION

This study investigated the impact of grazing intensity on soil biota communities in Inner Mongolian grasslands across four grazing intensity treatments, ranging from no grazing to heavy grazing. Our results indicate that grazing intensity had a significant effect on the species richness of soil fungi and nematodes communities but had less impact on soil bacteria communities. Moderate grazing intensity was found to promote the diversity of fungi and nematodes communities compared to no-grazing and high grazing treatments. The soil microorganism communities were also found to be sensitive to both soil chemistry and plant community diversity.

Positive interactions are represented by green lines, while negative interactions are represented by purple lines. Our findings indicated that grazing simplified soil microorganism networking at the species level.