Influence of Exclosure Year on Community Structure and Species Diversity on Typical Steppe

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Influence of exclosure year on community structure and species diversity on typical steppe

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Key words : typical steppe , seasonal exclosure , community structure , species diversity

Introduction Exclosure is the most common method for the restoration of degraded grassland , but in China complete exclosure of livestock from grassland is often difficult because of the poor economic status of pastoral areas . One of the measures to resolve conflict is seasonal exclosure (Katoh , 1998) . In this study , we investigated the influence of years of seasonal exclosure on typical steppe grassland to provide guidance for grassland management .

Materials and methods The study was done in Taipusi banner on typical steppe , Inner Mongolian Plateau (41°35′ to 42°10′ N , 114°51′ to 115°49′ E) , a semi-arid continent climate , average annual precipitation 407 mm , average temperature 1 .6℃ and chestnut soil . Four previously severely degraded ecological sites , based on historical documents and investigation , were chosen , where different exclosure periods applied (0 , 5 , 14 and 25 years of summer exclosure for hay cuts) . A field survey done in August 2007 (10-20 , 0 .5m×0 .5m , random quadrats per site) recorded all species in each quadrat , measuring total coverage and the height , coverage , density and yield of each species . Richness , evenness and diversity indices were calculated .

Results With increased periods of exclosure , coverage reached a maximum after year 14 , the year that density reached a maximum , though density then declined . Community yield and height continued to increase up to year 25 (Figure 1) . Plant species diversity (Margalef index Ma , Shannon-Weaver index H) initially increased then remained relatively constant after year 5 . The transformation tendency of evenness (Pielou index , Epi) showed little change . The community changed from *Potentilla acaulis*+*Artemisia frigida*+*Stipa krylovii* to *Leymus chinensis*+*Cleistogenes squarrosa*+*Serratula centauroides* .

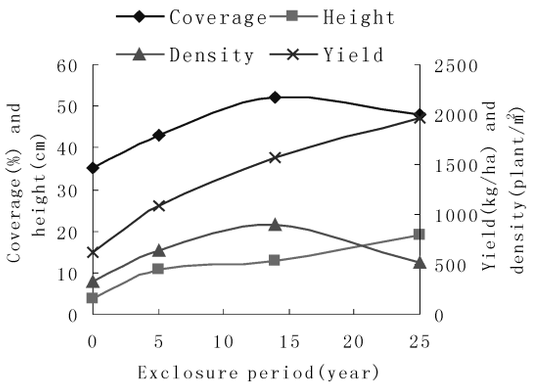

Figure 1 *Community structure and yield in different exclosure period .*

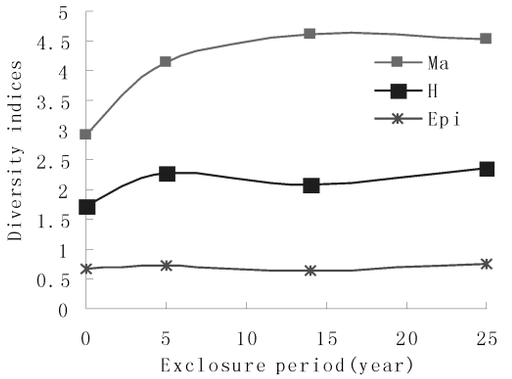

Figure 2 *Diversity index in different exclosure period .*

Conclusion Summer exclosure for hay production then grazing through the rest of the year did enable the grassland to recover to some extent . Fourteen years of seasonal exclosure appears a reasonable compromise , though the decline in density between years 14 and 25 warrants further study and maybe a change in management .

Reference

Katoh K . , Takeuchi K . , Jiang D , et al . 1998 . Vegetation restoration by seasonal exclosure in the Kerqin Sandy Land , Inner Mongolia [J] . *Plant Ecology* , 139 : 133-144 .