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Vegetation succession characters of desertification grassland in Hulunbeier steppe

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Introduction Recent years, because of the influences of nature factors and human activities (Mukaiyama S, 1998), the environment of the Hulunbeier steppe was gradually worsened. Grassland degradation seriously threatened the local ecological environment, which restricted the development of husbandry. For rational utilization and grassland protection, understanding the mechanisms and characters of vegetation successions may be important to restoration and reconstruction of Grassland ecosystem.

Materials and methods We sampled four field sites along a gradient of sand desertification in the Hulunbeier steppe from July to August in 2006, to represent the four stages of desert development: potential, slight, moderate and severe. Five 1m×1m plots were randomly established in study sites of four different desertification levels respectively. The height, coverage, biomass and species richness was recorded, and species importance values were calculated. Species diversity and Evenness index were calculated using the Simpson index and Pielou index. And index of grassland quality was evaluated according to palatability and coverage of grasses.

Conclusions Result showed that vegetation altered be regarded as species composition, species diversity, coverage and structure. Consequently (Table 1). Vegetation degradation of grassland was a process of decrease of species quantity, simplification of community structure, the height of plants, coverage, above-ground biomass were all correspondingly showed to decrease. Diversity index of communities was increased significantly in the stages of slight and moderate desertification. With the desert development, the index of grassland quality was significantly decreased, especially in the severe desertification stage, floristic composition transformation has occurred as unpalatable species encroached the area. With desert development, herbaceous species, especially grasses, were lost from the community composition and replaced by xerophytic grasses, for example *Compositae* species. Finally, psammophytic annual plants such as *Chenopodiaceae* species dominated vegetation composition, while Perennial plant maintained a low coverage. (Table 2).

Table 1 Characteristics of community construction in different stages of desertification.

Desertification level	Potential	slight	moderate	severe
Above-ground biomass(g/m ²)	113.95±5.22a	99.46±20.49a	83.09±12.27a	105.75±31.63a
Coverage (%)	71.67±2.89c	41.67±2.89b	16.67±2.89a	23.33±7.64a
Height (cm)	35.00±5.00b	28.33±2.89b	16.00±3.61a	26.67±5.77b
Rich index	10.33±0.58ab	12.00±3.46b	9.33±2.08ab	6.67±0.58a
Diversity index	1.55±0.12a	1.88±0.11b	2.00±0.12b	1.64±0.10a
Evenness index	0.66±0.04a	0.77±0.06b	0.90±0.06c	0.86±0.01c
Index of grassland quality	1.18±0.07d	0.92±0.07c	0.34±0.07b	0.11±0.03a

Note: Data with the same letter in one row are not significantly different ($P>0.05$).

Table 2 Species importance values in different stages of desertification.

Family	<i>Gramineae</i>	<i>Compositae</i>	<i>Rosaceae</i>	<i>Leguminosae</i>	<i>Chenopodiaceae</i>	others
Potential	0.71	0.04	0.01	0.02	0.04	0.18
slight	0.64	0.04	0.01	0.01	0.15	0.15
moderate	0.51	0.30	0	0.02	0.10	0.08
heavy	0.29	0.16	0	0.06	0.49	0

Reference

Mukaiyama S. Degradation of grassland in Keerqin sand land, Inner Mongolia, China. *J. Grassland Science*, 1998, 44: 109-114.

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