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Presenter Information

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Grazing and drought interactively influence total plant density

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Key words : heavy grazing , Inner Mongolian steppe , net primary productivity , plant height

Introduction Great changes have taken place in vegetation in Inner Mongolian steppe due mainly to overgrazing in the past four decades . Overgrazing and N losses in combination with altered soil physical parameters and water availability further have been shown to exert strong impact on plant productivity , total density and height (Cingolani *et al.* , 2005) . In addition to grazing disturbance , drought also can significantly affect species height and density due to different drought resistant or tolerant ability . However , drought and grazing always interactively influence the ecosystem processes in grazing ecosystems .

Material and methods Our experiment was conducted at one site protected from grazing since 1979 (UG79) , at one moderately grazed (MG) and one heavily grazed (HG) site in Inner Mongolian steppe . At peak biomass time in 2004 , 2005 and 2006 , plant material of 1 m x 1 m ground area was cut with grass shears down to the soil surface at these three experimental sites . 10 replications were done in each site . Additionally to the number of species , height , number of tillers and number of individuals were recorded before harvesting .

Results There was no significant interaction of plant height between grazing and year ($P < 0.001$) (Table 1) . Plant height decreases with increasing grazing intensity . Plant height has no significant difference in two dry years 2005 and 2006 . Grazing and year interactively affect total plant density ($P < 0.001$) (Figure 1) . In all three years , total plant density was highest at site HG and lowest at site UG79 and was higher in 2004 than in 2005 and 2006 .

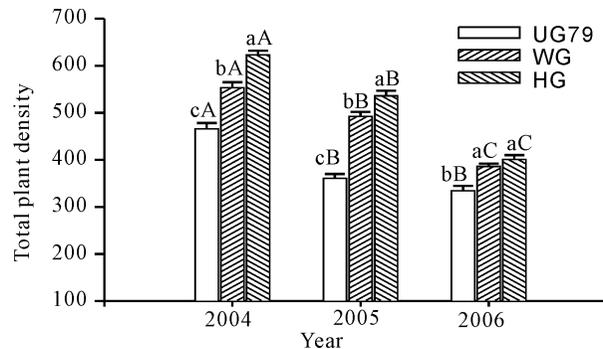


Figure 1 Total plant density at three differently managed sites . Symbols are as Table 1 .

Table 1 The average height of community (cm) at differently managed sites . Significant differences between grazing and years are indicated by different small and capital letters , respectively .

Sites	2004	2005	2006	Average
UG	31.0	25.0	22.7	26.2 a
WG	29.3	20.6	23.1	24.3 a
HG	11.0	7.0	6.8	9.0 b
Average	23.8 A	17.5 B	17.6 B	

Conclusions Heavy grazing leads to lower plant height and more small individuals . Drought reduces total plant density more at site HG than site UG79 , suggesting heavy grazing with a prolonged drought can seriously deteriorate grassland .

Reference

Cingolani , A . M . , Noy-Meir I . & Díaz S . (2005) . Grazing effects on rangeland diversity : a synthesis of contemporary models . *Ecological Applications* 15 , 757-773 .