

Changes in floristic diversity associated with sheep grazing management on a karst pasture

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Introduction Greater plant diversity, richness and lower primary production are more characteristic for karst (calcareous) pastures than for lowland grassland. In relation to the level of animal grazing required, light and moderate levels are usually most appropriate (Hart, 2001). From the conservation point of view grazing intensity should be variable between sites, and between parts of large sites, and timed to provide for the requirements of different species in different seasons (Dolek & Geyer, 2002).

Materials and methods Five sites with different grazing intensity (heavy (2x), moderate, light and zero) were located on the slope of the karst mountain Vremščica (820 m a.s.l.; 45°41' N; 14°12' E), where controlled sheep grazing management was initiated a decade previously. On the first heavily grazed site the shrub vegetation was also cut prior to the start of sheep grazing but the other sites had a herbaceous sward from the beginning. At each site, the vegetation on four replicate plots of 100 m² was mapped from 1999 to 2001 using the method of Braun-Blanquet. Shannon diversity index and evenness (Magurran, 2004) were calculated from data obtained in spring and summer mapping each year.

Results The pasture community at each site consisted of more than 32 species. With the removal of shrubs, vegetation secondary succession of the sward had started on the first heavily grazed site, and that is why the number of plants (121) was so high. But in the following two years a decrease in species was observed because grazing led to a more stable and dense sward. From 32 to 58 species were found under zero, moderate and heavy grazing. *Brachypodium rupestre* and *Calamagrostis varia* were prevailing grasses on the first heavily grazed site, but on the zero-grazed site *Bromus erectus* and *Carex humilis* dominated. Only a small proportion of the species found were legumes. The Shannon diversity index was lower (3.69 to 3.70) in the zero-grazed site and the contributions of the different species to total cover were more unequal (lower evenness - not shown here). Shannon indices indicated that the second heavily grazed site had fewer diverse plant communities than the lightly or moderately grazed sites.

Table 1 The Shannon diversity index and species number on five sites from 1999 to 2001 with respect to grazing intensity

Year/Intensity	Shannon diversity index					Species richness				
	heavy	heavy	moderate	light	zero	heavy	heavy	moderate	light	zero
1999	4.52c	3.80a	4.13b	3.92a	3.70a	121d	32a	40b	51c	48b
2000	3.81a	3.79a	3.94b	4.10b	3.71a	95c	41a	43a	55b	45a
2001	3.75a	3.85b	4.27c	4.31c	3.69a	91c	39a	39a	58b	41a

Means within a row followed by the same letter are not significantly different at P=0.05 according to Duncan's multiple range test.

Conclusions These results show that controlled sheep grazing management can preserve sward development in karst pastures. In the long-term a higher diversity can be expected when grazing swards on karst pastures with sheep at moderate or light intensity. At the same time, a heavy grazing intensity in those areas can act as a strong modifying factor to create a more productive grassland community (fewer species, but more productive sward) or as a tool for re-establishing the sward on abandoned land.

References

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