Plant strategies in relation to different grazing intensities

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Introduction

Plant species exposed to similar selection pressure can respond variously depending on their life strategy. The knowledge about plant strategies may be important in analysing the distribution and the population dynamics of species and may be useful in predicting the consequences of changes under different management regimes (Grime *et al.*, 1988). The objective of our research was to evaluate the effect of different intensities of cattle grazing on the basis of sward height on primary plant strategies.

Methods

Study site

The study was performed on experimental grassland in the Jizera Mountains, 10 km north of Liberec, Czech Republic. The average total annual precipitation in the region is 803 mm and the mean annual temperature is 7.2°C. The altitude of the study site is 420 m above sea level.

Treatments

➢ Extensive (**EG**) and intensive (**IG**) continuous heifer grazing
➢ The plots were arranged as two completely randomised blocks (0.35 ha) in 1998
➢ The percentage abundance of vascular plant species and compressed sward height were recorded in permanent
transects (2 transects of 40 m per each plot, regularly at a 1 m distance) estimated in 700 cm^2 circles (diameter 30 cm) in both study treatments
➢ Study periods: 2003, 2004, 2006, 2007
➢ Data were a priori categorised according to the sward height:
 a) heavily grazed patches (*h*) with heights less than 5.0 cm;
 b) rarely grazed patches (*r*) with heights taller than 10.5 cm

➢ For every presented plant a life strategy was assigned (Grime 1974) and the distribution of C-S-R life strategies was established
➢ ANOVA was used to evaluate the distribution of C-S-R life strategies in different patches

Figure 1: The study site in the Jizera Mountains.

Figure 2: The example of categorised sward patches on a transect line.
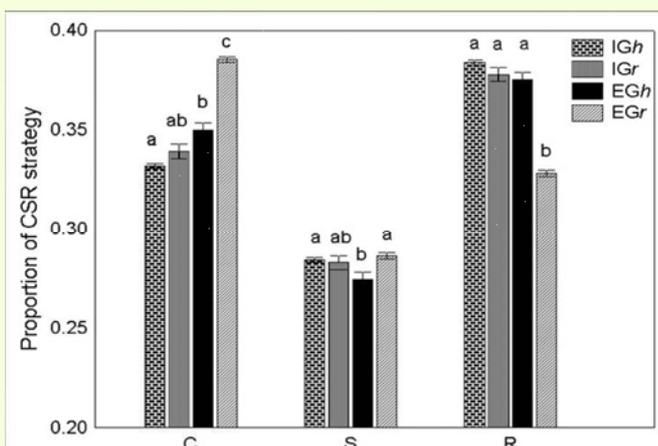

Figure 3: Weighted means of the CSR strategies in particular patches. The individual strategy with the same letter was not significantly different ($P < 0.005$), Tukey HSD test.

Results

➢ Different grazing intensities affected the presence of plant species with different life strategies.
➢ The proportion of C-S-R strategy in the particular sward patches was relatively stable during the study years.
➢ Significant effect ($P < 0.001$) of defoliation intensity on the presence of C and R strategists was found, but non significant on the presence of S strategists.
➢ EG*r* patches were not preferentially grazed by animals; the taller species with good light competition ability predominated (*Urtica dioica*); R-strategy was significantly lowest because of few disturbances.
➢ Intensively defoliated patches (IG*h*, IG*r*, EG*h*) promoted R-strategy - typical for managed pastures

Conclusion

The rate of each C-S-R strategy was more dependent on the rate of different sward patches in treatments than by grazing intensity itself.

Grime J.P. (1974): Vegetation classification by reference to strategies. *Nature* 250: 26-31
Grime J.P., Hodfson J.G. & Hunt R. (1988) *Comparative plant ecology: a functional approach to common British species*, Unwin Hyman Ltd, London, UK, 742 pp.