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PROJECT **EINÖDSBERG**

Managing or abandoning alpine grasslands – first results of a spider survey

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Introduction

A long-termed survey on the effects of land-use on epigeic arthropod assemblages in alpine habitats has been launched by the Bavarian Association for Bird Protection (LBV) in the German Alps after a change in land ownership in 2000. The extraordinary flower-richness in the grasslands of the region and especially on „Alpe Einödsberg“ originated from very specific geological and pedological conditions and from traditional land use – mowing for hay and extensive cattle grazing. However, intensive sheep pasturing has greatly reduced the floristic diversity of the study site, especially on the ridges. Restoration efforts since 2002, involving controlled grazing with cattle, have already resulted in positive effects on the vegetation structure. Parallel to vegetation monitoring, changes in spider and carabid assemblages are investigated since 2003 and until 2008.

Fig. 1: Study area „Alpe Einödsberg“

Material & Methods

16 permanent plots (5 x 5 m) were distributed on the mountain in elevations from 1530 to 1990 m a.s.l. (fig. 1). In each plot six pitfall traps (fig. 2) were installed every year since 2003 and analysed from 2-week-periods soon after snowmelt in June, in summer (July) and before first snowfall in September. In 2005 pitfall traps captured throughout the whole vegetation period and 5 additional plots were sampled in various vegetation types. Only adults are identified to species and included in the analyses.

We tried to guarantee replicate plots for the treatment “grazing” (levels: ungrazed, weakly grazed, intensily grazed) in the two main phytosociological associations: *Poa supina-Deschampsia cespitosa* on the ridge (former resting places of sheep) (fig. 3) and *Geo-montani-Nardetum* on the steep western facing slopes (fig. 4). Such data are analysed with ANOVA, but multivariate methods will be used to model responses of the species to environmental variables and factors.

Results

Spider fauna in the study area is rich: 126 species have been recorded so far (2003 - 2005), 19 species are considered as endangered. There is a very strong activity peak in spring, mainly caused by males of four lycosid species (*Alopecosa pulverulenta* (fig. 5)*, Pardosa amentata, P. oreophila, P. riparia*) (fig. 6). These strongly dominate the epigeic active spider assemblage (80 % of all individuals). Linyphiids made 10 % of the spider fauna, which is unusually low. Highest activity-based density (strongly biased by the lycosids), but also species richness was observed in the plots on the mountain ridge.

Comparing the different vegetation types highest species numbers were observed in the mat grass swards with mountain pine (42 species in grazed, 49 species in ungrazed plot) or blueberry-shrubs (*Vaccinium*: 38 species) and in the historically less disturbed mat grass swards (*Aveno-Nardetum*: 37 species). Some alpine species (*Centromerus incilium* (L. Koch), *Silometopus rosemariae* Wunderlich, *Talavera monticola* (Kulczynski)) have only been captured in less disturbed plots without cattle grazing.

Management of these areas by cattle grazing seems to have an effect on the activity-based density of the superdominant lycosid species, stronger on the historically more disturbed areas on the ridge (fig. 7), but so far did not result in significant changes in species richness on the plot level. The number of species in all permanent plots together however increased from 65 in 2003 to 74 in 2004 and 83 in 2005 (non-additive).

The final multivariate evaluation of the captures from 2003 to 2008, together with environmental variables (microclimate, soil-C/N, plant biomass) and botanical data, will allow assessing the progression of the spider fauna in the study area under the new grazing regime.

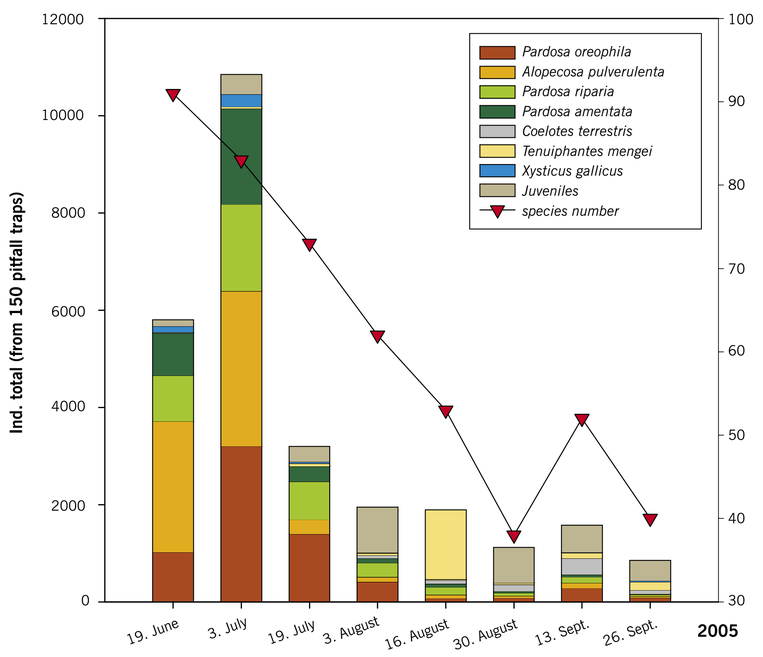

Fig. 6: Phenology of spider activity-based density in 2005

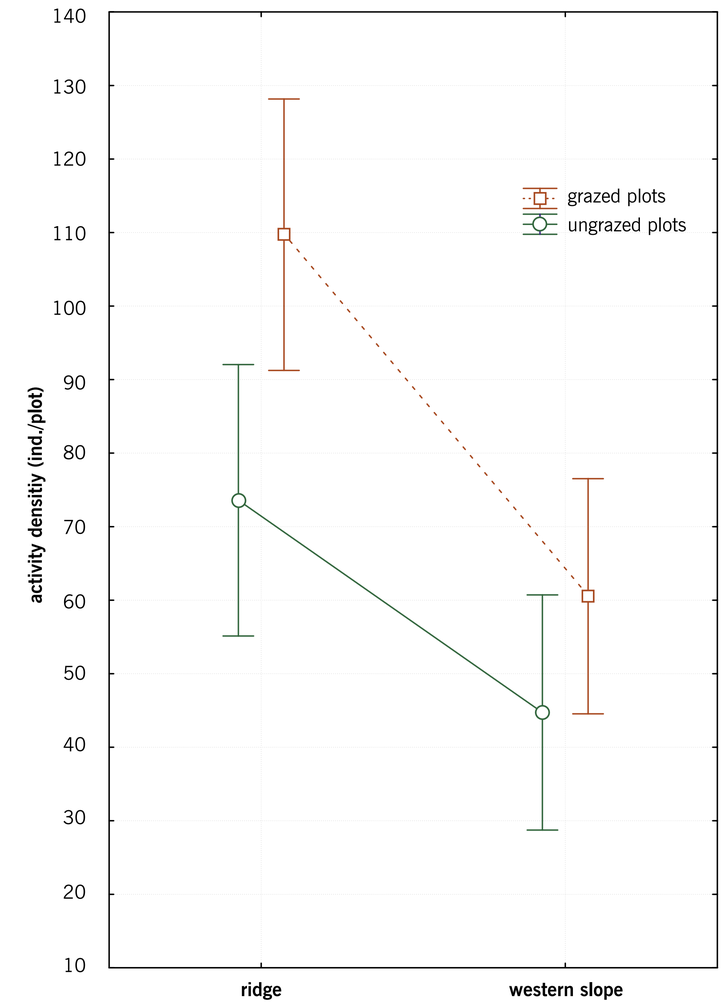

Fig. 7: Results of a repeated-measure ANOVA: effect of grazing: $F(1,10) = 11.2$, $p = 0.007$, vertical bars show 0.95 confidence intervals

Fig. 2: Pitfall trap

Fig. 3: Ridge area

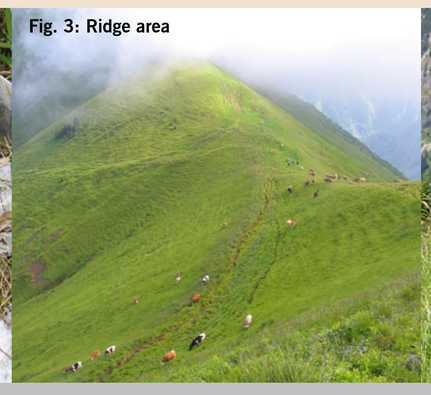

Fig. 4: Flower-rich Nardetum

Fig. 5: *Alopecosa pulverulenta* (Lycosidae)

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