

Nature conservation evaluation of alpine pastures in the Gesäuse National Park (Styria, Austria) by means of the bioindicators spiders, leaf- and planthoppers (Arachnida: Araneae; Insecta: Auchenorrhyncha)

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Abstract

Faunistic investigations in alpine grasslands in the Styrian "Gesäuse National Park" (Ennstaler Alps, Austria) should show the effects of grazing for nature conservation aims. The two bioindicator groups Araneae and Auchenorrhyncha were collected by means of pitfall traps and a G-Vac suction sampler in the vegetation period 2004: a total of 9.100 specimens were recorded, belonging to 82 epigeic spider and 53 leaf- and planthopper species. Twenty percent of the spider species are more or less endangered, one Auchenorrhyncha is new to Austria, and remarkably 10 spider- and 4 Auchenorrhyncha-species are new to Styria. The densities (G-Vac suction samples) varied from 2 to 30 specimens per square metre in spiders and 7 to 100 adults in leaf- and planthoppers. Suggested measures in nature conservation management include, among other things, a continuation of extensive grazing in selective meadows, the reduction of the densities in intensively grazed meadows, the cessation of grazing in sensitive wetland-biotopes and the increased consideration of biotopes without plant cover.

Introduction and aim of the study

The Gesäuse National Park lies within the Northern Calcareous Alps in Styria, Austria. Among some nearly natural forests, wide natural alpine meadows and rocky biotopes, there are quite large areas retaining a traditional form of grazing up to the present day.

This study is part of a broad interdisciplinary research study (coordination: Mag D. Kreiner). It deals with the nature conservation value of selected mountain pastures. An investigation of bioindicators, namely spiders, leaf- and planthoppers, should help answer the question whether the extraordinary expense of cattle grazing in barely-reachable areas during summer is worthwhile from a nature conservation point of view. In other words, we want to know if the effects of grazing are predominantly positive or negative for nature conservation purposes.

In addition, we used this project for the first recorded comparison of two widely used field research techniques, namely pitfall traps and a G-Vac suction sampler, in alpine grasslands. We wanted to learn something about the difference between recorded and estimated "real" biodiversity gained from these two techniques.

Study area and methods

The study area comprised four mountain pastures in the Gesäuse National Park, called Sulzkaralm, Haselkar, Hüpflinger Alm and Scheuchegg (47°32-34' N, 14°40-42' E; Ennstaler Alps, Styria, Austria), situated between 1.300 and 1.800 m a.s.l. Within these pastures, 10 areas with different biotope types (fenland, sedge swamps, oligotrophic grasslands, fresh and moist meadows) and different grazing intensities were marked and studied. The spider-, leafhopper and planthopper fauna was investigated (semi)quantitatively by means of 36 pitfall-traps (Barber traps) and a G-Vac suction sampler from July until September 2004. The registered datasets will be stored in the biodiversity database (BioOffice) of the national park.

Acknowledgements

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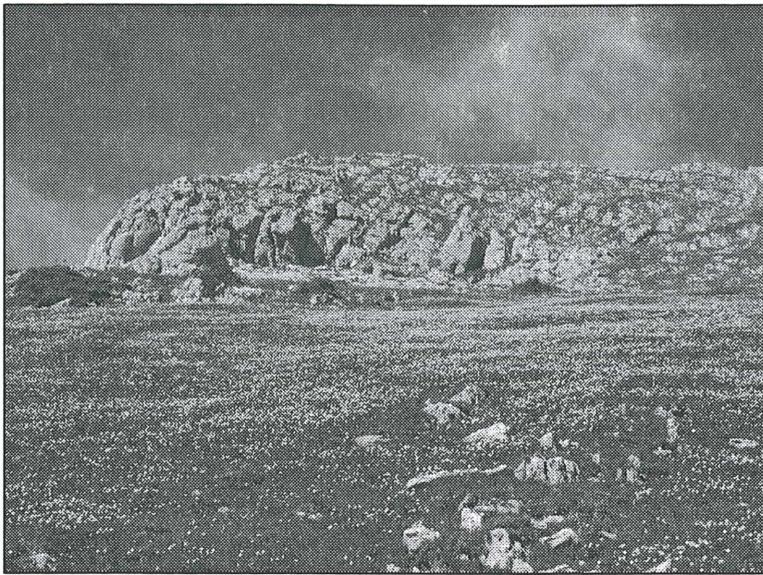


Fig. 1: The *Trollius*-dominated grassland "Haselkar Lugauer" in the Gesäuse National Park, Ennstaler Alps.
[photo: Ch. Komposch / ÖKOTEAM; 8.7.2004]

Results and discussion

The **spider fauna (Araneae)** is represented by 82 epigeic species from 15 families (3.500 specimens). The spider-coenoses are dominated by the lycosids *Pardosa amentata* (25.3 %), *P. riparia* (5.6 %), *P. oreophila* (3.0 %) and *Alopecosa pulverulenta* (2.9%). 19 species were caught in just one single specimen. On an average 17 species and nearly 250 specimens per locality could be reported; maximum values reached 30 species and 880 specimens. The densities (G-Vac suction samples) varied from 2 to 30 specimens per square metre with an arithmetic mean of 9.

The high number of 10 first species-records for Styria is remarkable. This state of affairs is due to three reasons: 1) the occurrence of rare taxa and the incomplete faunistic investigation of alpine biotopes (*Agyneta cauta*, *Erigonella subelevata*, *Evansia merens*, *Leptorhoptrum robustum*, *Meioneta affinis*, *Metopobactrus prominulus*, *Talavera monticola*), incorrect identification by former authors (*Erigone cristatopalpus*, *Lepthyphantus jacksonoides*; cf. KROPF & HORAK 1996) and the lack of formal publication of known records (*Xysticus secedens*; JANTSCHER 2001).

Oligotrophic dry and semi-dry grasslands and fens, bogs and moist meadows are rich in spider species. A high relevancy of special biotopes and structures like erosion-areas, uprooted root systems, stones and rocks could be documented via spiders. These biotope types bear very discrete spider coenoses and lead to a much higher diversity, even in intensively pastured meadows. Twenty percent of the spider species can be found in the red data list (cf. KOMPOSCH & STEINBERGER 1999), 11 species are assigned to the high-ranking categories "very rare" (R) and "endangered" (G, 3).

Non or extensively grazed meadows normally contain more valuable spider coenoses than intensive pastures. A significant correlation between an increasing intensity of grazing and a decreasing number of endangered species could be shown.

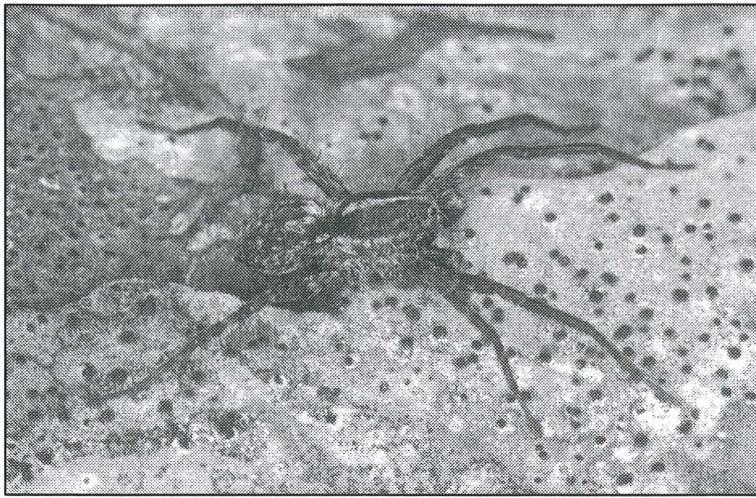


Fig. 2: The wolf spider *Pardosa oreophila* is a characteristic species of alpine meadows and pastures. [photo: Ch. Komposch / ÖKOTEAM]

5.600 **Auchenorrhyncha** specimens from 53 species were recorded; the densities varied from 7 to 100 adults per square metre. Some records were remarkable from a faunistic point of view; one species was new to Austria, another four were new to Styria. The leaf- and planthopper densities were almost constant during the whole vegetation period in extensively grazed meadows, while intensive grazing lead to a significant reduction of Auchenorrhyncha densities from spring to autumn. The "nature conservation value" of meadows decreases with increasing grazing intensity. This effect seems correlated to soil moisture; wet areas are more sensitive to intensive grazing than dry biotopes.

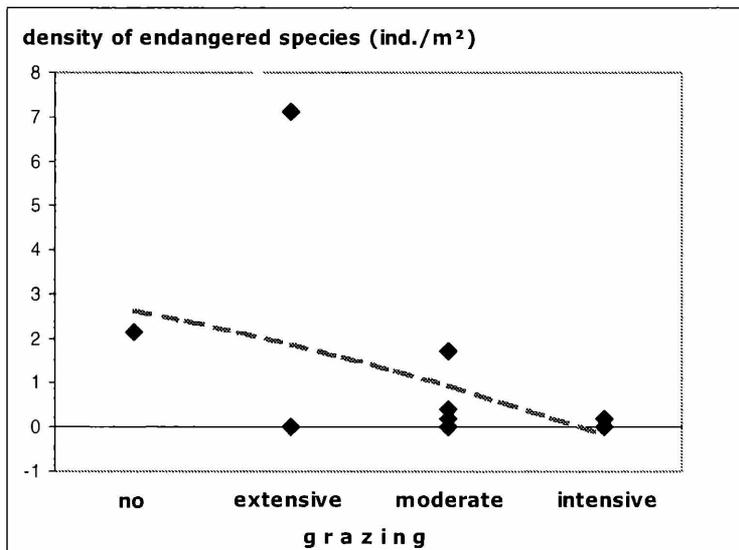


Fig. 3: Correlation (broken trendline) between the intensity of grazing and the density of endangered and valuable Auchenorrhyncha species in alpine pastures of the Gesäuse National Park.

Derived proposals for management and conclusions

A long-term protection of characteristic, stenotopic and highly-diverse arachnid- and insect-coenoses in alpine biotopes in the Gesäuse National Park requires the implementation of certain measures:

- ◆ continuation of extensive grazing in secondary meadows
- ◆ no grazing in primary woodless areas
- ◆ reduction of cattle-densities in intensively grazed meadows

- ◆ no grazing (fencing) of sensitive special biotopes like fens, raised bogs and spring horizons (endangered by eutrophication and trampling); indeed shrub invasion should be prevented by special tree-clearing measures
- ◆ further research studies in shrubbed alpine-areas, alpine mowed pastures and primary woodless alpine meadows (reference areas)
- ◆ increased consideration of biotopes and structures without plant cover (including their precious arachnid- and insect-coenoses) in nature conversation management

The study has shown, that on the one hand the recommendation of general measures for future projects is possible; on the other hand, a closer botanical and zoological examination of the management areas and proposals is useful and in many cases indispensable. In the present case precise packets of measures are offered for every biotope type of the investigated alpine pastures. Deficits exist concerning the interdisciplinary combination of botanical and the particular zoological results. Furthermore, the outstanding relevance of insects and arachnids in all biotope types of Central Europe is not being reflected neither in the number of research projects on national parks nor in the amplitude and extent of applied nature conservation work.

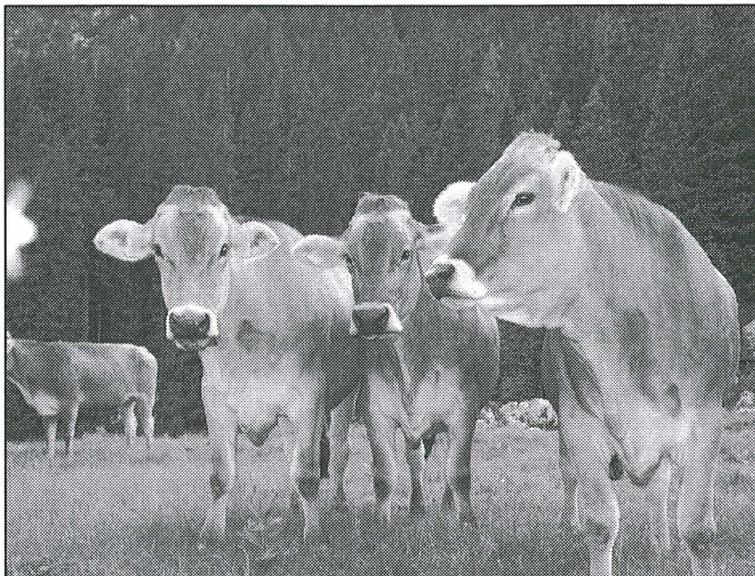


Fig. 4: Sensitive biotopes should be fenced against cows. [photo: Ch. Komposch / ÖKOTEAM; 8.7.2004]

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