Plant species richness and unpalatable species on mountain grasslands under changing farming activities

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ABSTRACT

We have initiated a multi-site field study aiming both to assess the interrelationship between pasture management, soil chemistry, soil moisture and to understand the impact of a native, unpalatable weed, *Ve at u a bum* L. on plant species richness on mountain pastures.
Here we present first results which indicate that species richness on small spatial scales is similar for all management methods, but differs on larger scales. Together with abundance of unpalatable species, management seems to play an important role in determining species richness on mountain pastures.

Fig.1. *Veratrum album*

Fig.2. Study site in the Savoie

METHODS

Within each of several Central Alpine regions, we analysed three sites, which represent three different management types (intensively and extensively grazed, and abandoned). Sites trios are situated within a 10 km circle and approximately at the same altitude. At each site a Modified Whittaker Plot (MWP) (Stohlgren et al. 1999) is constructed (cf. Fig.3).
Within 1m²-subplots, we sample soil, cut biomass and estimate percent cover for all plant species. Cumulative plants lists are made for the 10 m², 100 m² and 1000 m² plots.

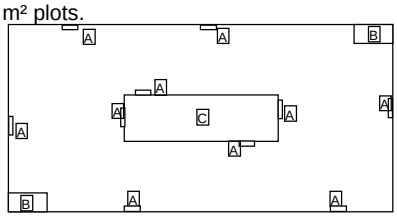

Fig.3. MWP consisting of 10 plots A (1 m²), 2 plots B (10 m²), 1 plot C (100 m²) and whole plot (1000 m²)

HYPOTHESES

We hypothesise that

1. total species richness decreases from extensively to abandoned to intensively used grassland
2. species richness between management types differs less on small spatial scales than on large spatial scales, and
3. cover of *V a b* decreases from abandoned to extensively to intensively used grassland.

PRELIMINARY RESULTS

The results presented here are based on the 9 sites sampled in the first year of the study, and should therefore be treated as first trends, rather than final results.

1. Species richness & spatial scales

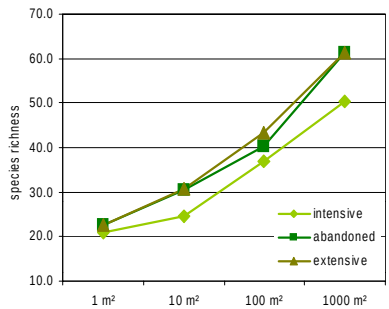

Fig.4. Species richness on 4 different spatial scales.

2. Species richness & *V a*

At the 1 m² plots, species richness is correlated with management* and cover of *V a bu* **(negatively) $DF=2;87, p<0.002, R^2_{adj}=0.114$

Fig.5. Extensive pasture with *V a bu*

ACKNOWLEDGE

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PRELIMINARY RESULTS

3. Management & cover of *a*

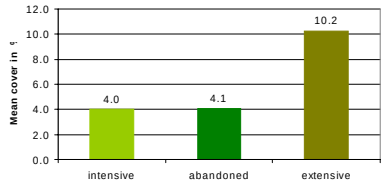

Fig.5. Mean leaf cover of *V a* in 1 m² plots

DISCUSSION

Differences in species richness between the three management types become apparent at scales ≥ 10m². This suggests a mosaic-like vegetation structure on extensively used and abandoned sites, which is also reflected by the higher total species richness on these sites in contrast to intensively used pastures. Tall, fast growing species like *a* can negatively influence species richness and, thus, can be seen as a threat to biodiversity.
The MWP is a powerful tool to accurately assess species richness at different spatial scales and to establish species-area curves. The use of this method in different areas of the Alps may generate a data collection that enables a Alps-wide comparison of species richness on mountain grasslands.

Fig.6. Abandoned pasture with *A s v d s* shrubs

CONCLUSION

Land use and abundance of unpalatable species play a key role for species richness of mountain pastures. Understanding factors involved in spread of unpalatable and potentially dominant species like *a* is crucial for sustainable management of mountain pastures.

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