

Segetal vegetation in the Ciuc Basin neighboring Miercurea-Ciuc (Eastern Carpathians)

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Introduction

The intramontanic Middle Ciuc Basin is known as a favorable location for agriculture. In many parts of Romania, subsistence and small-scale agriculture is still typical, as well as it is in the Basin. But while the arable farming is of great importance on a nationwide level, Harghita county is dominated by hay meadows and grassland farming, which are well known for their rich biodiversity (Demeter et al. 2011). The main aims of this study have been to stress out the importance of the vegetation from arable fields by quantifying the richness of the segetal vegetation in the basin and survey possible connections between the vegetation and different local factors.



Material & Methods

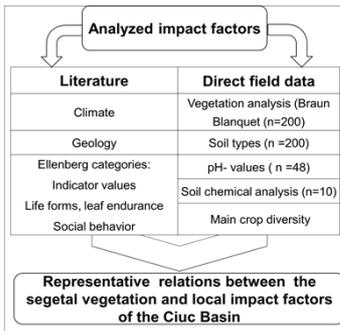


Fig. 1. Analyzed impact factors

Within an area of 35.8 km² in the Middle Ciuc Basin different factors (Fig.1) have been included in the evaluation to characterize the region:

Impact factors from literature

Information about local factors such as climate, geology and the different Ellenberg categories (1991) has been selected. The Ellenberg Indicator values include valuations about nitrogen, moisture and pH ranges. Also, the vegetation can be assigned to different social behavior, life forms and leaf endurance. These values have been evaluated from established literature sources.

Impact factors from field samples

By applying the Braun Blanquet method, 200 different arable fields, have been analyzed, each plot measuring a size of 25 m². On each analyzed field, the soil type was classified according to the guidelines from geological mapping of soils (2005). Slope, height above sea level and height of the crops were documented as well. On 48 random fields, pH-samples were taken with a Neudorff soil test kit. Furthermore, 10 nutrient analyses were made randomly, concerning nitrogen, phosphorous and potassium.

Vegetation analysis

For further interpretation of the examined factors, a Detrended Correspondence Analysis (DCA) and an Indicator Analysis have been conducted.

Results

Local Factors, nutrition supply and Ellenberg Indicators

In the area, a moderate continental climate with influence of the mountains prevails. The Average temperature is around 5.8°C with an average precipitation of 600 mm/a and a low dry period during vegetation period (APM 2005). The analyzed fields are situated on a level between 510-779 m above sea level.

The local factors show just small variation, which certainly is due to the natural basin of the area. Only phosphorus values evidently vary. Water, acid and base balance as well as the nitrogen household are very similar on the different fields. In general, the soils are well provided with humus, potassium and phosphorus. They have a medium nitrogen supply and the pH-values vary from light acid to light alkaline. The Ellenberg Indicator values confirm the chemical analysis. Furthermore, they reveal that the moisture is also on a medium level while the acid base balance shows a richness of base.

Social behavior

Life forms (Raunkiaer)	Percentage of the segetal vegetaion (%)
Therophyte	47
Hemikryptophyte	30
Others	23

Fig.2 Percentage of Life forms

Referring to Hüppe & Hofmeister (1990), Stellarietea mediae has been categorized in the association Sperguletalia arvensis for acid habitats with a scattered and minor continuity.

And into the *Papaveretalia rhoeadis* association on base dominated habitats with a more frequent and higher continuity. Due to the Ellenberg categories referring to social behavior only, 24.1% of the vegetation can be ranked among *Chenopodietea* and only 26.3% among *Secalietea*. However, over 49.6% belong to another social classification, which implies a high impact on extensive agriculture. Also, there is a high diversity of different main crops.

Vegetation analysis

133 different species have been found on the 200 fields. For example, common or problematic weeds like *Galium aparine*, *Convolvulus arvensis* or *Lathyrus tuberosus* have been found frequently, or with low frequency *Rumex acetosa* and *Galium mollugo ssp. album* as well as typical species of the submontane zone (*Galeopsis tetrahit*) and also 9 species on the german Red Lists like *Consolida regalis ssp. Regalis* or *Adonis aestivalis*.



Fig. 2 Adonis aestivalis found in the Ciuc Basin 2015

Interrelations between Vegetation and other impact factors

The DCA shows the species inventory in dependence of the local factors and farming. This indirect gradient analysis and the mean Ellenberg Indicator values have been included as environmental factors. "Outliners" influence the result with great impact. The DCA showed a clear difference between summer and winter green plants, these results have also been verified with an indicator analysis. Furthermore there is a significant impact of the crops height. No significant interrelation could be found between vegetation and the Ellenberg Indicator values, height above sea level, pH-Values, soil types, slope or number of species. Some species, in the center of the diagram, occur on many plots like *Galium aparine*. Other species, at the margin, occur only on a few plots, like *Achillea millefolium*. Species on the left side have been found more often on fields with summer crops and species on the right side on winter crops.

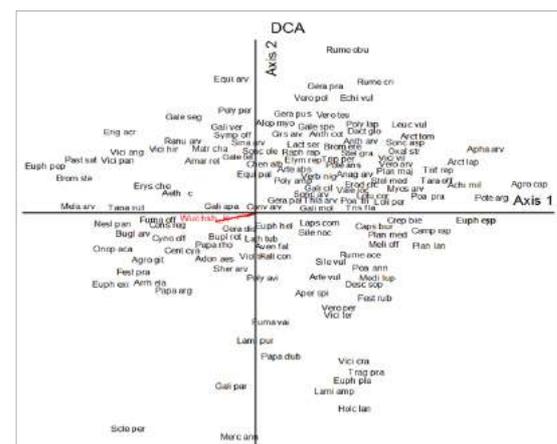


Fig.3 Detrended Correspondence Analysis

Conclusion

The Ellenberg Indicator values are specialized on the vegetation of Germany. Which complicates the interpretation if they are used in other countries. currently there is a great biodiversity within the segetal vegetation with 13.1 species per plot. Most analyzed factors indicate an extensive agriculture which favors a high biodiversity. The continuity of the species from the Red Lists vary highly as there are no official Red Lists for the segetal vegetation in Romania, the interpretation whether the species are endangered or not remain as a challenging aspect.

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