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Conservation, management and restoration of semi-natural and natural grasslands in Central Europe – Editorial to the 13th EDGG Special Feature

Naturschutz, Pflege und Wiederherstellung des halbnatürlichen und natürlichen Graslands in Mitteleuropa – Vorwort zum 13. EDGG Grasland-Sonderteil

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Zusammenfassung

Seit 13 Jahren werden von Mitgliedern der *Eurasian Dry Grassland Group* (EDGG) und deren Vorgängerorganisationen Grasland-Sonderteile (*Special Features*) in Tuexenia herausgegeben. Das diesjährige *Special Feature* trägt den Titel Naturschutz, Pflege und Wiederherstellung des halbnatürlichen und natürlichen Graslands in Mitteleuropa. Es enthält sieben Artikel, die das mitteleuropäische Grasland mit verschiedenen Ansätzen und Zielen untersucht haben. Die erste Studie untersucht in einem mesophilen Grasland den Einfluss der Weidewirtschaft auf den Artenreichtum der Moose, die zweite die Lebensraumansprüche der seltenen und gefährdeten Orchidee *Himantoglossum adriaticum*, die dritte Muster von Vegetation und Samenbank entlang eines Sukzessionsgradienten, die vierte die Verbreitung der Zwiebelpflanze *Sternbergia colchiciflora* in Pannonien, die fünfte den Ökosystemzustand des bulgarischen Graslands außerhalb von Natura 2000-Gebieten, die sechste Möglichkeiten der Wiederherstellung von Steppenrasen aus der Samenbank und die siebte die Syntaxonomie der Vegetation von Kalksteinausbissen in Podolien. Insgesamt wurden die Studien in sieben europäischen Ländern durchgeführt: Bulgarien, Deutschland, Rumänien, Schweiz, Slowakei, Ukraine und Ungarn. 43 Autoren aus sechs Ländern haben dazu beigetragen.

1. Introduction

The 13th EDGG Special Feature is entitled ‘Conservation, management and restoration of semi-natural and natural grasslands in Central Europe’. The following Special Feature on grasslands follows a long tradition in Tuexenia. It belongs to the series of Special Features and Issues organised by the Eurasian Dry Grassland Group (BECKER et al. 2016, TÖRÖK et al. 2016, DEÁK et al. 2017, VALKÓ et al. 2016, 2018). The latter (EDGG; http://www.edgg.org) is a network of researchers and conservationists interested in Palaearc-

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tic natural and semi-natural grasslands (VENN et al. 2018). The EDGG has a considerable role in facilitating grassland research and disseminating results through organising conferences, field workshops and compiling a grassland vegetation plot database (GrassPlot, DENGLER et al. 2018).

The present Special Feature spans different study organisms and scales. Its contributions investigate the effects of grazing management on the species richness of bryophyte species in mesic grasslands (BOCH et al. 2018), habitat preferences of the rare and endangered lizard-orchid *Himantoglossum adriaticum* (BÓDIS et al. 2018), patterns of aboveground vegetation and soil seed bank along a successional gradient from grassland to forest (BITTNEROVÁ et al. 2018), the distribution of the bulbous plant *Sternbergia colchiciflora* in grassland habitats preserved in Pannonian cemeteries (MOLNÁR V. et al. 2018), the ecosystem conditions of grasslands in Bulgaria, outside of the country's Natura 2000 network (SOPOTLIEVA et al. 2018), the potential of seed banks in the recovery of *Stipa*-dominated and steppe-like dry grasslands (SZABÓ & RUPRECHT 2018) and the vegetation of limestone outcrops in Podillia (DIDUKH & VASHENIAK 2018). The studies were conducted across Central and Eastern Europe (in Bulgaria, Germany, Hungary, Romania, Slovakia, Switzerland and Ukraine). A total of 43 authors from six countries contributed to the Special Feature. In the following, the studies are shortly summarized:

Bryophytes are a notoriously understudied group in vegetation surveys. This is particularly true for mesic grasslands in Europe, a habitat of secondary origin that has been intensely studied for its vascular plant species richness and the response of the latter to different management regimes. BOCH et al. (2018) analysed how different forms of land-use types and environmental conditions shape bryophyte species richness across 707 plots of mesic grasslands, in three regions of Germany. They found pastures to harbour a 2.5 times higher bryophyte species richness than meadows and mown pastures. Among the pastures, areas grazed by sheep had a three times higher bryophyte species richness than areas grazed by cattle or horses. These results can be partly explained by the wealth of micro-niches for bryophytes in sheep grazed pastures. In addition, fertilized sites showed a decline in bryophyte species richness. The authors conclude that low-intensity management, such as grazing by sheep, provides the most benefit for bryophyte species richness in mesic grassland.

BÓDIS et al. (2018) aimed to shed light on the habitat preferences of the rare and endangered lizard-orchid *Himantoglossum adriaticum* across its entire distribution range. They conducted field surveys and used vegetation records from the European Vegetation Archive (EVA) and from literature sources. These sources covered populations from Austria, Bosnia-Herzegovina, Croatia, the Czech Republic, Hungary, Italy, Slovakia and Slovenia. They then used a phytocoenological approach and ecological indicator values to characterize the vegetation of the populated sites. In addition, they developed indicator values for the species entire distribution range. Beside various semi-natural dry to mesic grassland types, the species occurred in dry shrublands, but also was found in secondary man-made habitats such as roadsides. Based on the indicator value analyses, *H. adriaticum* prefers open vegetation on rather dry, basiphilous soils with a medium to high carbonate content, a low salt concentration, a relatively high humus content and a low nutrient concentration.

BITTNEROVÁ et al. (2018) studied the variation in plant community and soil seed bank composition along a successional gradient from grassland to forest, in the Poľana Mountains in Slovakia. Besides comparing the above- and below-ground species composition and richness, the authors were particularly interested in the question whether two space-for-time substitution approaches yield similar results compared to a resampling of plots. Time was

substituted either by the distance of plots along a Norway spruce colonisation gradient (i.e., successional stages) or by soil depth, where a deeper soil layer represents an earlier successional stage than an upper soil layer. They found a decrease of seed density in all studied approaches. The composition of the soil seed bank was only weakly related to the above-ground vegetation with increasing dissimilarity along the successional gradient, which was confirmed by both the distance-for-time substitution and the re-sampling approach. This implies that the species turnover can be predicted using the distance-for-time substitution approach. However, the differences in species richness of the soil seed bank found with the resampling approach were not confirmed with the space-for-time substitution approaches, indicating their limitations in predicting the temporal development of the seed bank during succession compared to the resampling of plots. They further highlighted the restricted potential of using the soil seedbank for grassland restoration (see also SZABÓ & RUPRECHT 2018), because of the generally small numbers of species and the strong temporal decrease of seed densities in the seed bank.

MOLNÁR V. et al. (2018) studied the distribution of the red listed *Sternbergia colchiciflora* in grassland habitats preserved in Pannonian cemeteries. They also investigated the effect of different management regimes (mown and not mown) on the seed production of the species. In their systematic botanical survey of 154 localities they explored 27 new populations and confirmed three formerly known occurrences of the species. The rarity of the species was linked to the huge loss of dry grasslands during the past century (SENGL et al. 2016). The performed results underline that the so called 'sacred sites', such as cemeteries, church yards, shrines and ancient burial mounds have a considerable conservational potential and act as refuge for grassland species, even in highly transformed landscapes (FRASCAROLI et al. 2015, DEÁK et al. 2016, 2018). They found that mowing had no effect on the seed production of *S. colchiciflora* because of the peculiar phenology and small stature of the species. The species can avoid the direct effects of mowing, as the plant has above ground organs between September and May, in that period mowing is not typical. Furthermore, due to the small stature of the species occasional mowing events generally do not affect the flowers and fruit which are only 3–10 cm from the ground surface. The nonsignificant effects of mowing on the seed production suggests that even the leaf tips are often cut by mowing machinery, it does not affect the general fitness of the individuals.

Semi-natural grasslands in Europe have been extensively studied in terms of the biodiversity and their importance as habitat for endangered species (GREGOR et al. 2016, KUZMANOVIĆ et al. 2016, SZABÓ et al. 2017, DENGLER et al. 2018). However, their ecosystem conditions have rarely been assessed, especially at the national scale. Sopotlieva and colleagues evaluated the ecosystem conditions of grassland across Bulgaria by focusing on the less-well explored areas outside of the country's Natura 2000 network (SOPOTLIEVA et al. 2018). They mapped individual polygons for five different grassland habitat types (dry, mesic, wet and seasonally wet, alpine and subalpine grasslands, inland salt steppes) and linked them to existing vegetation plot data and other sources (e.g., GIS database on red list plants). Overall, their results show that the majority of Bulgarian grasslands outside of the Natura 2000 network are in a very good to good condition and can thus provide important ecosystem services. However, the authors found some notable exceptions. For instance, grasslands in close proximity to agricultural areas or to settlements with high human population density were found to be in a bad and very bad condition with respects to plant species richness. Furthermore, half of the dry grasslands polygons were in a bad condition with

respect to invasive alien species. The authors suggest that land managers consider the assessed ecosystem conditions when managing individual grassland polygons.

SZABÓ & RUPRECHT (2018) analysed the seed bank and aboveground vegetation in a 40-year-old black pine plantation, which was established on a former dry grassland in Transylvania. Even though *Stipa*-dominated steppe-like dry grasslands represent a great nature conservation priority in the whole European Union, many of their stands had been overplanted by pine or black locust to hinder landslides on the steep slopes and produce timber (see also DITTRICH et al. 2016). The study reported that seed density in the soil seed bank of the pine plantation was higher than that of the intact grassland. Even though the seed bank of the plantation was species poor, it still contained a considerable amount of the target species, which likely originated from the seed rain received from the neighbouring intact grassland patches. They also found strong populations of grassland species in the understory of the plantation. This, together with propagules of grassland species in the seed bank, can be a promising resource for the successful spontaneous regeneration of such sites after the trees are removed (KISS et al. 2016, PRUCHNIEWICZ et al. 2016). Due to the presence of ruderal species in the seed bank of the plantations, active management measures might be needed during the restoration process to avoid weed encroachment and enhance the transport of the propagules of zoochorous grassland species (SCHULZE et al. 2014, STORM et al. 2016).

Finally, DIDUKH & VASHENIAK (2018) studied vegetation of limestone outcrops in Podillia (Ukraine). Since the beginning of the 20th century, the classification of Podillian xerophytic herbaceous vegetation has attracted great interest. Until about 1990, in the area, the classification was based on dominant principles, since then, it is increasingly based on floristic-ecological criteria. In this time, the Podillian endemic alliance *Galio campanulatae-Poion versicoloris* has been described with several associations (KUKOVITSA et al. 1992) but in the following there was intensive discussion about the existence and position of the regarding units (KUZEMKO 2009, DIDUKH & VASHENYAK 2012, KUZEMKO et al. 2014). However, recent large-scale classification (e.g., WILLNER et al. 2016) requires revision of the position of several lower syntaxa from the *Brachypodietalia*, *Stipo pulcherrimae-Festucetalia* and *Alysso-Sedetalia* in Podillia. In this article, authors tried to clarify the boundaries between the orders and the syntaxonomic position of the concerning associations, especially for the Podillian endemic alliance *Galio-Poion versicoloris* by using new high quality data containing also cryptograms.

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