

Minireview

Grassland research and conservation within the Eurasian Dry Grassland Group (EDGG)

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Summary. Grassland ecosystems are sources of biodiversity, natural beauty and cultural values. Recent land-use changes and the gradual loss of traditional rural cultures, eutrophication from agricultural fertilization, and airborne nitrogen deposition from multiple sources has resulted in rapid loss of grassland biodiversity, and homogenization is detectable in almost all types of Palaeartic grasslands. The Eurasian Dry Grassland Group (EDGG) is an international organization dealing with research and conservation of Palaeartic grasslands, with more than 1200 members from nearly 70 countries. This contribution summarises the EDGG research and conservation activities over a decade of EDGG existence (2008-2017). Grassland research was supported mainly by preparation of special issues on grassland-related topics in international scientific journals, organizing research fieldworks and expeditions, and establishment of the GrassPlot database. Grassland conservation initiatives such the Smolenice Grassland Declaration highlight the necessity of strong and comprehensive international frameworks and well-developed national strategies for grassland conservation, which are still missing.

Keywords: biodiversity, database, GrassPlot, Palaeartic, research expedition, special issue.

INTRODUCTION

Semi-natural grasslands are unique ecosystems that evolved thanks to long-lasting human agricultural activities. They are unique in their extraordinary biodiversity, aesthetic value and irreplaceable ecosystem services. It is thus sad to observe their rapid decline over the last decades, not only in overall territory but also quality. The Eurasian Dry Grassland Group (the EDGG) was established to prevent further grassland deterioration and to take action on behalf of grassland conservation. The members of this international organization made significant efforts to organize scientific conferences, research expeditions and to gather as much knowledge as possible to elucidate the recent status and developments of grassland ecosystems in the Palaeartic biogeographical realm, as well as to attract the attention of both the scientific and non-scientific world to these extraordinary values, which are worthy of being maintained for future generations. This con-

tribution summarises the EDGG research and conservation activities over one decade of EDGG existence (2008-2017).

GRASSLAND ECOSYSTEMS

Grasslands include herbaceous vegetation types that are mostly dominated by grasses (Poaceae) or other graminoids (Cyperaceae, Juncaceae) and have a dense vegetation cover, usually > 25% (Janišová et al. 2011). Among the four main types of Palaeartic grasslands (zonal steppes, arctic-alpine grasslands, azonal and extrazonal grasslands and secondary grasslands; see Dengler et al. 2014 for details), the secondary semi-natural grasslands host an especially enormous diversity of organisms belonging to various taxonomic groups and thus are among the world's richest plant communities (Wilson et al. 2012; Chytrý et al. 2015). Due to recent land-use changes, the gradual vanishing of traditional rural cultures,

eutrophication from agricultural fertilization, and also airborne nitrogen deposition from multiple sources, rapid loss of biodiversity and homogenization are detectable in almost all types of Palaearctic grasslands. Especially vulnerable are the semi-natural grasslands in regions where traditional rural cultures have gradually become 'extinct' and only analogies of traditional grassland management are used to maintain grassland habitats in selected protected areas. In these highly fragmented landscapes, such activities are successful only to a limited extent (e.g. Bonari et al. 2017).

THE EURASIAN DRY GRASSLAND GROUP

Eurasian Dry Grassland Group (EDGG, formerly known as European Dry Grassland Group) is an international organization dealing with research and conservation of Palaearctic grasslands, with more than 1200 members from nearly 70 countries. Recently, it was one of the official working groups of the International Association for Vegetation Science (IAVS). The main activities of the EDGG are (i) the facilitation of international communication between researchers, site managers, policy and decision-makers; (ii) coordination of scientific and policy-related actions in grassland research, conservation and restoration; (iii) promotion of the development of databases for grassland classification, conservation and restoration; (iv) organisation of annual events, such as the Eurasian Grassland Conferences (EGCs) and Field Workshops (formerly known as EDGG Research Expeditions); and (v) dissemination of research results in Special Features of peer-reviewed international journals (for details see Vrahnakis et al. 2013 and <http://www.edgg.org/>).

Grassland-focussing special issues in international scientific journals

During 2008-2017, the EDGG initiated, contributed to and published 16 special issues/special features in international scientific journals, all of them focusing on grassland research. At the beginning, special issues included mainly contributions from annual EDGG meetings (e.g. Jandt et al. 2010; Janišová et al. 2011b; Galváněk et al. 2012). Gradually, the broader scientific community was invited to contribute to selected topics relevant for deepening our current knowledge of grassland ecosystems. There is already a well-established tradition to publish annually at least one special issue in *Tuexenia* (e.g. Becker et al. 2013, 2016; Ruprecht et al. 2015; Deák et al. 2017) or in *Hacquetia* (e.g. Carboni et al. 2015; Valkó et al. 2016, 2018). Along with these, special issues were also published in *Agriculture, Ecosystems & Environment* (Dengler et al. 2014), *Biodiversity and Conservation* (Habel et al. 2013; Török et al. 2016), *Applied Vegetation Science* (Dengler et al. 2013), *Phytocoenologia* (Janišová et al. 2016) and *Plant Biosystems* (Janišová et al. 2011a).

EDGG annual meetings and conferences

During 2008-2017, the EDGG organized ten annual meetings and conferences in the following venues: Halle, Germany (2009), Smolenice, Slovakia (2010), Uman', Ukraine, (2011), Prespa, Greece (2012), Zamość, Poland (2013), Tula, Russia (2014), Mainz, Germany (2015), Sighisoara, Romania (2016), and Riga, Latvia (2017). In 2018, the Eurasian Grassland Conference took place in Sulmona, Italy (Burrascano et al. 2018). These meetings offered a framework for exchanging ideas about grassland management, restoration and protection, discussing and disseminating results of grasslands research, meeting colleagues with similar interests from a diverse range of countries, and for developing multiple collaborations (Vrahnakis et al. 2013).

Research expeditions and field workshops

Since 2008, the EDGG has organized eleven research expeditions aimed at gathering high-quality biological and ecological data on the composition and biodiversity patterns of grasslands in understudied regions of the Palaearctic. Destinations of the former expeditions were Romania (Dengler et al. 2009; Turtureanu et al. 2014), Ukraine (Dengler et al. 2010; Kuzemko et al. 2014; Kuzemko et al. 2016), Bulgaria (Apostolova et al. 2011; Pedashenko et al. 2013), Sicily (Guarino et al. 2012), Greece (Dengler and Demina 2012), Khakassia (Janišová et al. 2013; Polyakova et al. 2016), Spain (Biurrun et al. 2014), Poland (Kački et al. 2014), Serbia (Ačić et al. 2017), Italy (Filibeck et al. 2018) and Austria (Magnes et al. 2018). The methodology of data sampling during these EDGG expeditions was proposed by Dengler (2009) and has been revised and improved over the last 10 expeditions and recently described in detail (Dengler et al. 2016a). Data collected in these expeditions have been used for a series of regional studies on phytosociological classification (e.g. Dengler et al. 2012; Pedashenko et al. 2013; Kuzemko et al. 2014) and drivers of plant diversity (e.g. Turtureanu et al. 2014; Kuzemko et al. 2016; Polyakova et al. 2016).

GrassPlot database

The GrassPlot database aims at complementing existing broad-scale vegetation databases such as the European Vegetation Archive (EVA) and the global database "sPlot". The special focus of GrassPlot is on multi-scale and multi-taxon sampling in precisely delimited plots with extensive environmental data. The GrassPlot database was established in March 2017. It succeeds the former database of nested-plot data from grasslands in Europe founded in 2010, which consisted mainly of data collected during EDGG Research Expeditions/Field Workshops. The purpose of GrassPlot is to establish and maintain a common data repository of high-quality vegetation-plot observations (relevés) of grasslands

and related vegetation types from the Palearctic biogeographic realm, and to facilitate the use of these data for non-commercial purposes, mainly academic research and applications in nature conservation and ecological restoration.

GrassPlot contains high-quality plot observations (relevés) of eight standard grain sizes (0.0001, 0.001, 0.01, 0.1, 1, 10, 100 and 1000 m²) as well as nested-plot series with at least four different grain sizes. The use of GrassPlot is regulated through Bylaws that intend to balance the interests of data contributors and data users. The current version (Dengler et al. 2018) contains data for approximately 170000 plots of different sizes and 2800 nested-plot series. About 14000 plots have near-complete records of terricolous bryophytes and lichens in addition to vascular plants. At present, GrassPlot contains data from 36 countries throughout the Palearctic, spread across elevation gradients and major grassland types.

Grassland conservation initiatives

Since its establishment, the EDGG has participated in several science-based policy activities. Of these, the Steppe Appeal was initiated with the principal aim of promoting the protection, restoration and sustainable development of the Ukrainian steppes (see Vrahnakis et al. 2013 for details).

To support the practical conservation of High Nature Value grasslands in Europe, the Smolenice Grassland Declaration was adopted during the 7th EDGM held in Smolenice (Slovakia). After its publication through the EDGG media, it has received general acceptance and has been signed by 330 scientists, representatives of NGOs, ministries, politicians, farmers, and other people concerned about the conservation of dry grasslands from a total of 41 countries. Eight years after its formation, the call for a comprehensive grassland conservation strategy still remains a dream of many grassland researchers and conservationists.

Smolenice Grassland Declaration (June 2010)

Europe supports a huge variety of grassland ecosystems, both natural and those made or managed by man, spanning the coasts and high mountain regions and ranging from tundra in the North to the Mediterranean in the South and from the Azores in the West to the Ural Mountains in the East. These grassland ecosystems provide many goods and services such as food/forage, climate regulation, securing water and nutrient cycling, medicine and energy – all related to human health, prosperity and well-being in general.

Furthermore, grasslands are home to both wildlife and domestic livestock. For several groups of plants and animals, grassland ecosystems are characterized by remarkably high biodiversity. Many parts of Europe landscapes with pastures, meadows and/or natural grasslands contain regional biodiversity hotspots and support high proportion of native and rare species.

In spite of European states' commitment to the Convention on Biological Diversity objective of halting biodiversity loss by 2010, and in spite of the global importance of European pastures and meadows, the area covered by grasslands continues to decline dramatically, in particular due to conversion to cropland or abandonment; the remaining grasslands are often impacted by changes of management and accompanied by eutrophication, causing the regional extinction and the high global extinction risk of many species.

We note that while many European countries have water and forest legislation and strategies, which promote a coherent vision and an integrated policy approach, grasslands lack such a framework and the effects are clear to see.

We therefore call for a strong and comprehensive Convention on Grassland Conservation in Europe within the framework of the Pan-European Landscape and Biodiversity Strategy, to secure the future of grasslands which provide vital ecosystem services to human society, are home to biodiversity, sources of natural beauty and cultural values.

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