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PALAEARCTIC GRASSLANDS

Journal of the Eurasian Dry Grassland Group

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Palaearctic Grasslands, formerly published under the names *Bulletin of the European Dry Grassland Group* (Issues 1–26) and *Bulletin of the Eurasian Dry Grassland Group* (Issues 27–36), is the journal of the Eurasian Dry Grassland Group (EDGG). It appears in four issues per year. *Palaearctic Grasslands* publishes news and announcements of EDGG, its projects, related organisations and its members. It also serves as an outlet for scientific articles and photo contributions.

Palaearctic Grasslands is freely available at http://edgg.org/publications/bulletin and new issues are announced to all EDGG members.

Submissions following the Author Guidelines are welcome by the deadlines of the four issues: 31 January, 30 April, 31 July and 31 October.

Scientific articles (Research Articles, Reviews, Forum Articles, Scientific Reports) should be submitted to the Receiving Editor Jürgen Dengler (dr.juergen.dengler@gmail.com) and will then undergo peer review, so publication in a certain issue cannot be guaranteed.

All other text contributions (News, Announcements, Short Contributions, Book Reviews, Glimpses of a Grassland…) should be submitted to Anna Kuzemko (anyameadow.ak@gmail.com) AND Idoia Biurrun (idoia.biurrun@ehu.es).

Photo contributions (photos for general illustrative purposes with captions; Photo Stories; contributions to Photo Competitions) should be submitted to the Photo Editor Rocco Labadessa (rocco.labadessa@gmail.com).

Contributions to the section **"Recent Publications of our Members"** should be sent to Iwona Dembicz (i.dembicz@gmail.com) and those for **"Forthcoming Events"** to Alla Aleksanyan (alla.alexanyan@gmail.com). Any member of EDGG who would like to see their book reviewed in *Palaearctic Grasslands* should communicate with our Book Review Editor Péter Török (molinia@gmail.com).

Palaearctic Grasslands is published by EDGG c/o Prof. Dr. Jürgen Dengler, Plant Ecology, BayCEER, University of Bayreuth, Universitätsstr. 30, 85447 Bayreuth, Germany.

Palaearctic Grasslands on ResearchGate
Palaearctic Grasslands on Google Scholar
Palaearctic Grasslands on vegsciblog.org

Editorial Board

On front cover page: *Campanula stevenii* on Mt. Sabalan, Iran. Photo: J. Noroozi.

Editorial

Dear readers,

On the eve of the new field season, we are pleased to present you *Palaearctic Grasslands* issue 49. After the last elections to the EDGG Executive Committee (see p. 4), we implemented some changes to *Palaearctic Grasslands*. We are now a team of four Chief Editors with equal rights, but distributed roles. Most importantly, we have abandoned the former practice of publishing an issue when enough material is ready; instead we have now four issues per year with fixed deadlines. We also welcome some new members to our Editorial Team. You can read all this and more on pages 6–7. Our aim to strengthen *Palaearctic Grasslands* as a peer-reviewed scientific journal is underlined by two scientific articles in this issue, one of which introduces a new category of scientific articles "Methods in Grassland Ecology". It is no coincidence that this article is published in the May issue, when many of us are planning our field research, so that some of its methodological recommendations and suggestions could be applied in practice already during the current field season. Unfortunately, the Covid-19 pandemic continues, which imposes its own adjustments of our activities. Therefore, in this issue we also provide updated information on the EDGG events planned for this year, while at the same time we hope that all our plans will come true.

We hope that despite preparations for the fieldwork season, you will find time to read the new issue and find inspiration from its contents. We wish you enjoyable reading and productive and eventful summer months.

Idoia Biurrun, Jürgen Dengler, Anna Kuzemko & Rocco Labadessa

The Glanville fritillary (*Melitaea cinxia*) near the Siedliska village, Roztocze upland, SE Poland. Photo: P. Chmielewski.

News

New Executive Committee of EDGG for the period 2021–2023








The elections to the new Executive Committee (EC) were completed on 15 March, when the Chair of the Election Committee, Péter Török, announced the following results:

179 EDGG members have voted (with up to 7 votes). The votes were distributed as follows (in decreasing order).

- **Idoia Biurrun (Spain): 166 votes (93%)**
- **Jürgen Dengler (Switzerland): 131 votes (73%)**
- **Anna Kuzemko (Ukraine): 129 votes (72%)**
- **Iwona Dembicz (Poland): 113 votes (63%)**
- **Didem Ambarlı (Turkey): 98 votes (55%)**
- **Stephen Venn (Finland): 91 Votes (51%)**
- **Rocco Labadessa (Italy): 89 votes (50%)**
- **Alla Aleksanyan (Armenia): 85 votes (47%)**
- Alireza Naqinezhad (Iran): 80 votes (45%)
- Frank Yonghong Li (China): 49 votes (27%)

According to the EDGG Bylaws, the seven candidates with the highest number of votes are elected, plus the first candidate from outside Europe, which means that the persons marked in bold form the EC for the period 2021–2023, consisting of eight members with equal rights. We thank Alireza Naqinezhad and Frank Yonghong Li for their participation in the election.

In its first video conference 22 March 2021, the new EC decided on the following assignment of responsibilities:

- **Secretary-General:** Jürgen Dengler – Deputy: Didem Ambarlı
- **Treasurer and Representative to IAVS:** Jürgen Dengler – Deputy: Idoia Biurrun
- **Membership Administrator:** Idoia Biurrun
- **Chief Editors of *Palaearctic Grasslands*:** Idoia Biurrun, Jürgen Dengler, Anna Kuzemko & Rocco Labadessa
- **Editor of Website:** Alla Aleksanyan – Deputy: Rocco Labadessa
- **Conference Coordinator:** Didem Ambarlı – Deputies: Stepen Venn & Alla Aleksanyan
- **Field Workshop Coordinator:** Iwona Dembicz – Deputy: Idoia Biurrun
- **Special Feature Coordinator:** Jürgen Dengler – Deputy: Didem Ambarlı
- **Social Media Administrator:** Stephen Venn – Deputy: Anna Kuzemko

The Executive Committee

Thanks to Péter Török

After one decade in the Executive Committee (EC) of EDGG, Péter Török has decided not to run for another term of duty. He joined the EC in 2011, where he took on the responsibility of Treasurer, a task which is always unpopular and difficult to fill. He was also very active in the organization of Special Issues, as well as book reviews for our journal, *Palaearctic Grasslands,* and its forerunner, the EDGG Bulletin. Péter joined us at a time when his academic career was developing fast, and he was promoted to the post of Full Professor at Debrecen University in 2019. Péter was very effective in taking care of the responsibilities of his post as Treasurer; the budget was always managed well, and he was very effective in negotiating with the IAVS to secure the funding necessary for our activities and projects. Péter was also good at integrating his academic role with his organizational duties. Students and researchers from his group were very active in the Eurasian Grassland Conferences, and other activities, generally travelling together, and probably having the lowest per capita ecological footprint of any of our conference participants.

Pèter Török and Monika Janišová during the adventurous excursion to Atlantic rainforests in Brazil. Photo: J. Dengler.

Pèter Török and Mike Vrahnakis, both former chairs of the EDGG, discussing the properties and potential uses of *Stipa*-grasses in Prespa 2012. Photo: Y. Kazoglou.

The whole group was very actively involved in both the academic programme, the cultural programme and social life at the events. When there were difficult situations to be dealt with in the committee, Péter always remained impartial and patient, helping us to resolve issues effectively. Another aspect of Péter's character that we all appreciated is his dry sense of humour. Within our community, Péter had a reputation for being effective in his work and effective also in resting. During the 14th EGC, Péter was resting so effectively that he missed the departure for the mid-conference tour by an hour. Fortunately he managed to get a lift and caught us up within 100 km. Of course it is important that there is turnover in the governance of an academic society, with some long-serving officials stepping aside after their period in office and new members taking a turn. As a matter of fact, Péter will not leave EDGG completely, but continue as member of the Editorial Board of *Palaearctic Grasslands*, and he also will organise the overnext Eurasian Grassland Conference in Debrecen to which we are looking forward.

We are grateful to Péter for his long and effective contribution and hope to still see him in our future conferences and events.

Stephen Venn & the rest of

the Executive Committee 2021–2023

News from *Palaearctic Grasslands*

While in the last period 2019–2021, *Palaearctic Grasslands* (PG) had one Chief Editor and two Deputy Chief Editors, the newly elected Executive Committee of EDGG has decided to appoint the four of us as Chief Editors with equal rights for the period 2021–2023, to cope with the much increased importance of PG and the associated workload. Internally, we have agreed to distribute the tasks and responsibilities as follows:

- **Jürgen Dengler**: Receiving Editor for scientific articles, PG on Research Gate and Google Scholar, Chief Editor meetings
- **Idoia Biurrun**: Coordination of linguistic editing, PG on vegsciblog
- **Anna Kuzemko**: Receiving Editor for all textual items except scientific articles, PG on EDGG website, in Facebook and on Twitter
- **Rocco Labadessa**: Photo Editor, typesetting/layout of issues, DOI handling.

There are also changes in the wider Editorial Team: We welcome Alireza Naqinezhad (Iran) and Ricarda Pätsch (Czech Republic) as new Scientific Editors and Hallie Seiler (Switzerland) and Sean Cooch (United Kingdom) as new Linguistic Editors. Edy Fantinato (Italy) succeeds Rocco Labadessa as Chair of the Photo Competition Jury.

With the appointment of two additional Scientific Editors, we would like to strengthen the position of PG as a peer-reviewed scientific journal. With "Methods in Grassland Ecology", we introduced a fifth article category, in addition to "Research Papers", "Reviews", "Forum Papers" and "Scientific Reports". The first such methodological paper can already be seen in this issue (pp. 22-26). We hope that these measures contribute to more submissions of scientific articles to PG, aiming at the publication of perhaps two to four such articles per issue. Publication in PG is quite attractive as we offer a diamond open access journal (i.e. free for authors and readers), competent, friendly and fast editorial handling and we specifically encourage the submission of papers based on limited datasets from local to regional studies, which would not be acceptable for journals indexed in the Web of Science. Therefore, PG is particularly suited, among others, for the publication of results from Bachelor and Master theses. Please spread the word among your students and colleagues!

The one change that will probably affect readers and contributors most, hopefully in a positive manner, is that we have decided to publish PG from now on in a regular interval of three months, that is, four issues per year, in contrast to the previous "flexible" mode that meant waiting until "enough" material had accumulated, but actually leading to longer and longer delays from one issue to the next. The strict deadlines for submission of text and photo material to the responsible Chief Editor are:

- **31 January** for the February issue
- **30 April** for the May issue
- **31 July** for the August issue
- **31 October** for the November issue

Please adhere to these deadlines as materials submitted after these deadlines will be published only three months later. These deadlines do not apply to scientific articles, which can be submitted anytime and will be published in the PG issue subsequent to acceptance (following one or several rounds of peer-review and revision). As a consequence of this change in publication mode, the thickness of issues can vary considerably, which we do not see as a problem, particularly as we do not distribute the issues via e-mail anymore and therefore file size is not a limiting factor.

We hope that these changes will make PG even more attractive for you as authors, photographers and readers, and we look forward to your submissions and your suggestions.

Jürgen Dengler, Idoia Biurrun, Anna Kuzemko & Rocco Labadessa

***Linum flavum* in Biala Gora dry grassland, Tomaszow Lubelski, SE Poland. Photo: P. Chmielewski.**

New editors in *Palaearctic Grasslands*

Ricarda Pätsch, Czech Republic

By presenting reports on scientific grassland excursions, showing the most beautiful shots of open landscapes and grassland plants, and by increasingly integrating scientific articles, *Palaearctic Grasslands* reflects both the joy of studying grassland diversity and the need for grassland research within the Palaearctic realm. I am looking forward to joining the team of scientific editors and to contributions on diverse grassland types from no less diverse scientists. By the way, any studies on salt-affected grasslands are welcome here as well!

Hallie Seiler, Switzerland

I appreciate how the contributions in *Palaearctic Grasslands* offer so much information about open landscapes and their communities, both in writing and through vibrant, evocative photographs. As a linguistic editor, I hope to support the journal in disseminating knowledge about these habitats and promoting their conservation.

Sean Cooch, UK

Grasslands face an uncertain future, so the relaunch of *Palaearctic Grasslands* is timely. I would like to see it cover areas such as where grasslands fit in a new agricultural and ecological environment, what mechanisms exist to ensure their survival both in terms of policy, protection and restoration. I would also like to see grassland fungi given a bigger profile. What's not to love about rainbow coloured waxcaps.

Alireza Naqinezhad, Iran

Grasslands and steppes are the most dominant, beautiful and diverse vegetation formation across the majority of SW Asian countries. Many unknown plant species and plant communities should be explored in these valuable ecosystems. One of the duties of *Palaearctic Grasslands* could be promoting and mobilizing scholars in this area to publish their local but highly interesting achievements. I hope to introduce the grassland and steppe biodiversity of Iran (and hopefully other countries of SW Asia) through aesthetic photos and papers on flora and vegetation.

Photos in *Palaearctic Grasslands*

As usual, we are looking forward to your contributions to the Photo Story section, as well as your photographs for general illustrative purposes.

Submissions for the **Photo Story** section are always welcome. Photo Story is an open space where members can submit their own photo collection on a certain grassland-related topic of their choice. High-quality photos should be provided together with their captions (at least species names or landscape description), a brief text and possibly other graphical elements (like a map or a drawing). The selection of photos should fit within 3-8 pages and the contributors should propose a preliminary layout (in PDF or MS Word format), which will be finally typeset by Editors. As an example, you can look at the Photo Stories published in the previous issues.

As with scientific articles, Photo Stories undergo a review process with a focus on photo quality. There is no guarantee that they will be accepted without changes, and late submissions may be published in subsequent issue.

As announced in the last issue of *Palearctic Grasslands*, we would also like to encourage you to contribute to **the Global Vegetation Project** with your vegetation photographs:

1) If your photos have already been published in *Palaearctic Grasslands*, you can submit them to the global map citing DOI of your article or of the whole issue (you can find all published issues here: https://edgg.org/publications/bulletin);
2) If you are submitting new vegetation photographs to *Palaearctic Grasslands*, either within an article, a photo story or for general illustrative purposes, you can provide each photo file with the following information (* = required fields):
   - Date (year/month/day),
   - author's full name*,
   - place name,
   - latitude and longitude*,
   - vegetation type,
   - vegetation classification system,
   - naturalness,
   - dominant species list*,
   - additional comments.

Please take a look at the project website (http://gveg.wyobiodiversity.org) for an overview of the global map and the data entry form.

If you want to contribute to Photo Stories, or if you simply want to help us with enriching this aspect of the journal, please submit your photos together with required information to Rocco (rocco.labadessa@gmail.com).

Deadline for photo submissions is **31 July 2021**.

Rocco Labadessa, Italy
rocco.labadessa@gmail.com

***Briza media* in Vilnius region, Lithuania. V. Gudynienė.**

Call for Photo Competition

The theme of the current Photo Competition is "**Spirit of grasslands"**. According to the classical Roman religion, the Genius loci was the protective spirit of a place. It represents the identity of a given place, and it can manifest itself through a particular spatial configuration or specific attributes. Have you ever encountered the Genius loci of a grassland?

You are invited to send up to three high-quality photographs within the competition theme (full size JPEG or TIFF images, at least 300 dpi) together with captions giving a short title or description and information on the subject (species name, date, place name).

The Photo Jury (see imprint) will select the best photographs. The three best shots will be awarded with full space in the next issue, but we reserve the right to use other submitted materials for illustrative purposes in other parts of the issue.

If you want to take part in the competition, please submit your photos together with required information to Edy (edy.fantinato@unive.it) by **31 July 2021**.

Edy Fantinato, Italy
edy.fantinato@unive.it

Density of EDGG members

As of 21st April 2021, the Eurasian Dry Grassland Group had 1,347 members. All of the continents of the world were represented, except for Antarctica, with members coming from 64 different countries. Palaearctic countries with the highest number of members were Germany, Greece and Italy, with 236, 118 and 84 members, respectively. However, considering member density, the top five positions are occupied by Estonia, Greece, Latvia, Slovenia and Switzerland, with 12.1, 11.3, 8.5, 8.2 and 7.6 EDGG members per million inhabitants, respectively. Several Palaearctic countries are void of members, such as Iceland, Egypt, Libya, Syria, Lebanon, Jordan, Iraq, Uzbekistan, Tajikistan, Afghanistan, Turkmenistan, Nepal and North Korea, while other have very low densities, among them India, Pakistan and China, although the three have only part of their territory in the Palaearctic realm (Fig. 1).

Figure 2 shows membership development since the foundation of EDGG in 2008. After a steep increase during the first year, membership slowly but steadly grew until 2018, when there was a sudden small decrease due to updating. Afterwards, membership started to rise again.

We encourage new members from all over the Palaearctic realm to join the Eurasian Dry Grassland Group. Researchers from underrepresented areas like North Africa, the Middle East, Middle, Central and East Asia are especially welcome! While in Europe, EDGG is already widely represented among grassland researchers in most countries, we have some noticeable gaps, mainly in Montenegro, Iceland, France, Moldova and Belarus.

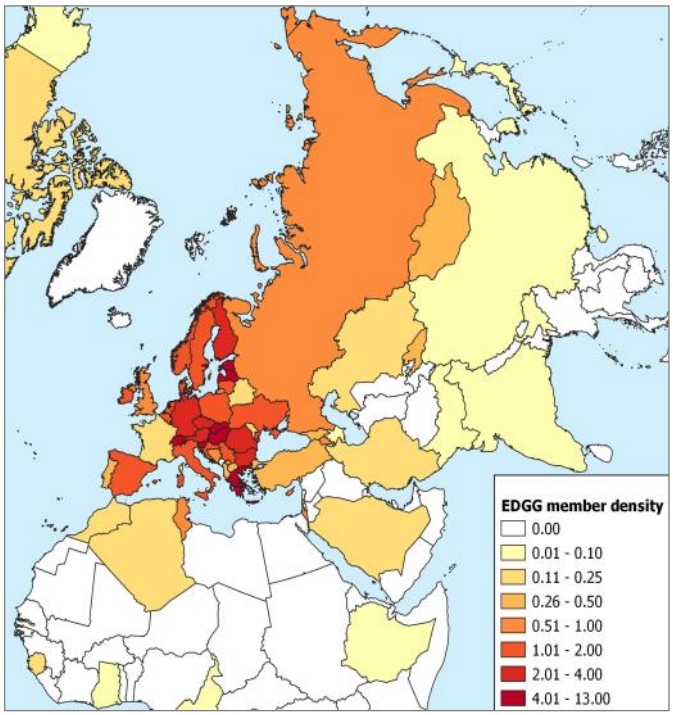

Fig. 1. Map showing the density of EDGG members per 1 million inhabitants. It focuses on the Palaearctic realm. Therefore, the member densities of the USA (0.0060), Brazil (0.0047) and Australia (0.1960) are not shown. The population data of the countries was obtained from https://www.worldometers.info/ (extracted on 21 April 2021).

Idoia Biurrun, Didem Ambarlı, Rocco Labadessa & Jürgen Dengler

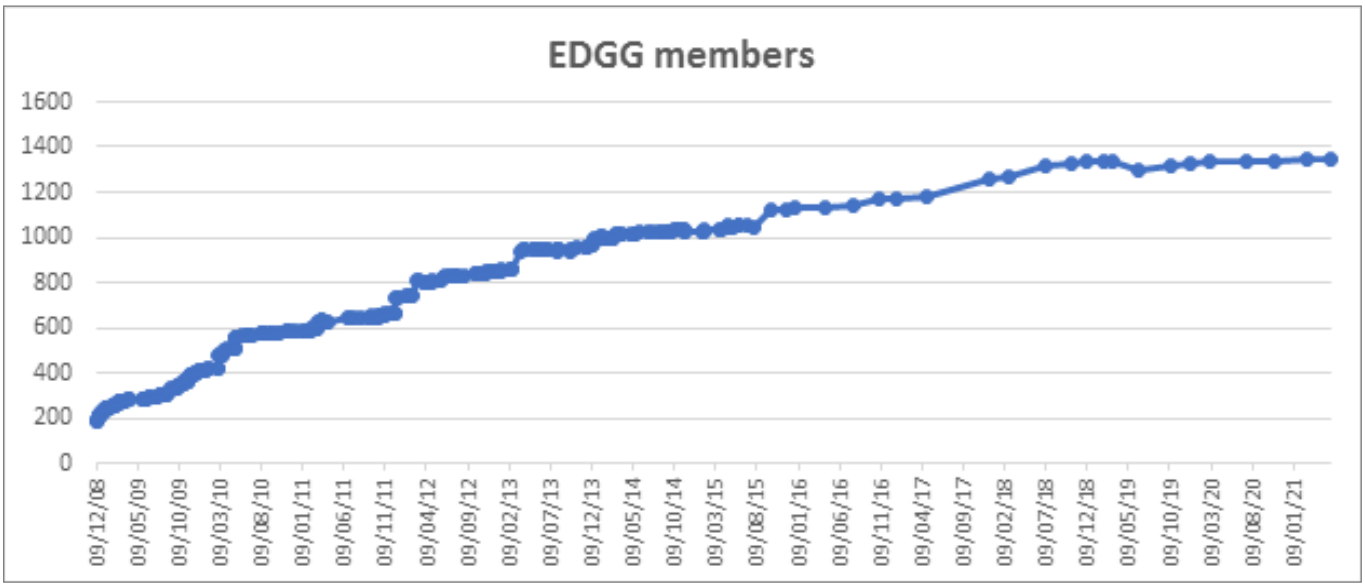

Fig. 2. Membership development since the foundation of EDGG in 2008.

EDGG Event

Postponement of the Eurasian Grassland Conferences

As you are probably aware, due to the Covid-19 pandemic, we have once again had to postpone the 2020 Eurasian Grassland Conference (EGC). Unfortunately, the pandemic situation is still severe in many parts of the region and vaccination programmes have not proceeded well enough to allow us to travel and have a face-to-face conference safely. Therefore, the Local Organizing Committee of the planned conference in Tolosa, Spain (Idoia Biurrun, Itziar García-Mijangos, Javier Loidi, Juan Antonio Campos, Isabel Salcedo, Peter B. Pearman, Asun Berastegi), in consultation with the EDGG Executive Committee, have decided to postpone the Tolosa conference until 2022, when hopefully the situation will be quite different. The conference will be held with the same theme, sessions and a similar schedule next year. Detailed information on dates and registration will be announced on the EDGG website and in *Palaearctic Grasslands* during winter 2021/22. We hope that our keynote speakers and participants will be able to join us then, and that we will be able to welcome all of you to Tolosa. Consequently, the conference planned to be organized by Péter Török and his colleagues next year in Hungary, has been postponed until 2023.

EDGG Conference Coordinators:

Didem Ambarlı, Düzce, Turkey
didem.ambarli@gmail.com

Alla Aleksanyan, Yerevan, Armenia
alla.alexanyan@gmail.com

Stephen Venn, Finland
stephen.venn@helsinki.fi

EDGG Field Workshop:
"Ukrainian steppes along climatic gradients" postponed to 2022

As you may have read in the former issue of *Palaearctic Grasslands* 48, in February we were still optimistic about organizing the Field Workshop "Ukrainian steppes along climatic gradients" this year. Unfortunately, the worsening epidemiological situation in the recent weeks has forced us to postpone it again to 2022.

We really hope that those of you, who wanted to participate, will be able to join us in 2022. We will aim to announce the details in *Palaearctic Grasslands* 51. The Field Workshops in South Tyrol, Picos de Europa and Slovenia have been postponed to summer 2023, 2024 and 2025, respectively.

While there is unfortunately no large official EDGG Field Workshop in 2021, two long-standing members of EDGG intend to organise two small *ad hoc* Field Workshops using the same sampling methodology, whose data then also will be fed into the pool of EDGG Field Workshop data in the GrassPlot database: one to sandy and desert steppes of southern Ukraine (24 May – 2 June 2021) and one to alpine habitats of different regions in Switzerland (ca. 13–26 September 2021). For these *ad hoc* Field Workshops there is no funding from EDGG or IAVS, as they are not open to all EDGG members, but usually only to those with good knowledge of the local flora and the Field Workshop methodology. The number of participants is limited and the local organisers are free to decide whom they would like to include in the team. These events will be organised more flexibly and less formally. Participation in the *ad hoc* Field Workshop in Ukraine was offered only to persons registered in the previous year, and registration is now closed. If you are interested in the *ad hoc* Field Workshop in the Swiss Alps please contact Jürgen Dengler (dr.juergen.dengler@gmail.com).

EDGG Field Workshop Coordinators:

Iwona Dembicz, Warsaw, Poland
i.dembicz@gmail.com

Idoia Biurrun, Bilbao, Spain
idoia.biurrun@ehu.es

EDGG Event

EDGG's virtual events for autumn and winter 2021-2022

We do have two items of good news related to forthcoming events. First of all, we will continue to organize Talk Grasslands! in which we will broadcast inspiring talks about grassland research and conservation once a month during the off-field season. Furthermore, we are excited to inform you about a new virtual event. In February 2022, we will organize a virtual conference specifically on the grasslands of Asia. Below you find the first details about the event. We hope you will join and enjoy the events.

***Orchis anthropophora* in Alta Murgia National Park, Puglia, Italy. Photo: R. Labadessa.**

Conference on Grasslands of Asia (February 2022)

Asia is home to vast grasslands. It is very diverse in habitats, species and land-use practices. Its environmental conditions, species pools and natural history are quite different from the rest of the world. For that reason, EDGG will organize a virtual conference to exchange information about grassland research and conservation in Asia. The event will be remarkable for the EDGG community, as opportunities to meet with Asian colleagues and learn about their research, are limited in our usual conferences. We invite researchers to present studies on the ecology, biodiversity, management and conservation of Asian grasslands.

The conference will take place during three-half days on the Zoom platform in February 2022. We will ensure a broad level of regional representation in this event, highlighting research from less well-known parts of the continent. Besides the regular, speed and keynote talks, we will organize optional events and virtual happy hours, in which participants can meet and talk to friends and colleagues among the participants on a separate platform. Registration will be free of charge. In conjunction with the conference, we plan a special feature in an international peer-reviewed scientific journal, open to all authors who give presentations. Full details regarding the time, date, registration and other relevant information will be announced in the future *Palaearctic Grasslands*. We hope to meet many researchers working on grassland research and conservation in Asia!

EDGG Conference Coordinators:

Didem Ambarlı, Düzce, Turkey
didem.ambarli@gmail.com

Alla Aleksanyan, Yerevan, Armenia
alla.alexanyan@gmail.com

Stephen Venn, Helsinki, Finland
stephen.venn@helsinki.fi

EDGG Publication

Call for the 7th EDGG Special Feature in *Hacquetia*: Fauna, flora, vegetation and conservation of Palaearctic natural and semi-natural grasslands

This is the first call for the submission of manuscripts for the EDGG-edited Special Feature in *Hacquetia* 2021. We welcome manuscripts about natural and semi-natural grasslands, on all taxa and from any region in the Palaearctic realm (Europe; West, Central and North Asia; North Africa).

Hacquetia (https://ojs.zrc-sazu.si/hacquetia) is the international journal of the Biological Branch of the Slovenian Academy of Sciences. It has two issues per year, both in print and online. Through offering longer articles, diamond open access publication and free reproduction of colour figures, it is a very attractive publication option. Currently it is indexed in the Scopus and BIOSIS literature databases, and it is likely to be included in the Web of Science in the near future (aided by our very international and high-quality Special Issues and your citations of these articles).

This Special Issue will be the 7th EDGG-edited Special Issue in *Hacquetia*, following the five successful issues in 2014/1, 2015/1, 2016/2, 2018/1, 2019/2 and 2021/1. It will be available as the second journal issue in June 2022 (approximate date), with around 150–250 pages reserved for our articles. It will also contain a report on the EDGG activities of the previous year.

Procedure and deadlines: The **deadline for full-text submission is 24 September 2021** and manuscripts will undergo the normal peer-review process. If you are interested in contributing a manuscript for this comprehensive Special Issue, then please contact the chief of the guest editor team (Orsolya Valkó, valkoorsi@gmail.com) and submit your manuscript directly to her. Manuscripts will be checked by the editorial board and suitable manuscripts will undergo the normal peer-review process.

For detailed author guidelines please consult the earlier issues of the Journal or contact the chief of the guest editors directly.

Guest Editor Team:

Orsolya Valkó, Hungary Google Scholar

Didem Ambarlı, Turkey Google Scholar

Alireza Naqinezhad, Iran, Google Scholar

Rocco Labadessa, Italy, Google Scholar

Stephen Venn, Finland, Google Scholar

Contact for questions and submission of manuscripts (Chair of the Guest Editors): **Orsolya Valkó** (valkoorsi@gmail.com)

***Stipa ucrainica* in the ancient valley of Western Manych, Russian Federation. Photo: O. Demina.**

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Forum Article

Focused on farmers: On the irreplaceable role of man and his animals in biodiversity conservation

Monika Janišová[1*], Martin Magnes[2] & Harald Rötzer[3]

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[2]Division of Plant Sciences, Institute of Biology, University of Graz, Austria; martin.magnes@uni-graz.at

[3]AVL Agency for Vegetation Ecology and Landscape Planning, Vienna, Austria, harald.roetzer@a-v-l.at

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Palaearctic Grasslands 49 (2021): 13–21

Abstract: The need to consider land-use history when protecting habitats in cultural landscapes has been documented frequently in the scientific literature. However, after the extinction of traditional rural cultures, the nature conservation praxis faces the difficult task of finding appropriate but practicable and economical analogues of extinct agricultural practices. The aim of this forum article is to provoke a debate on biodiversity conservation in a cultural landscape and the sustainable management of dry calcareous grasslands. We present the complexity of this issue using an example from the Hainburger Berge Mountains in north-eastern Austria, a Natura 2000 site rich in dry grasslands. We then go on to discuss desirable directions for future European agricultural developments. In this area, traditional farming was already abandoned by the mid-20th century. Due to the high conservation value of the area, nature conservationists developed a restoration plan in the 1980s. Since then, re-introduction of sheep grazing by pioneer farmers Elisabeth and Erich Zillner is contributing to maintaining local biodiversity. On the Slovak side of the Danube River, in the Devínska Kobyla National Nature Reserve, reintroduction of grazing to valuable dry grassland habitats only started in 2012. In our story focused on a farmer's perspective, we would like to demonstrate that grassland farming is never independent from food production and people's way of life. Personal interviews with farmers and employees of conservation institutions helped to clarify different perspectives and allowed us to see things in a new light. We consider that development of local markets together with product-based subsidies, taking into account local conditions, are the most efficient way to support sustainable farming practices and biodiversity.

Keywords: biodiversity; Devínska Kobyla; dry grassland; family farm; goat; Hainburger Berge; history; Hundsheim; NATURA 2000; sheep; subsidy.

Submitted: 3 February 2021; first decision: 25 February 2021; accepted: 22 April 2021

Scientific Editor: Didem Ambarlı

Linguistic Editor: Richard Jefferson

Fig. 1. The Hainburger Berge Mountains are situated at a junction of the Alps, the Carpathians and the Pannonian Basin. View from Braunsberg to Hainburg, Hundsheimer Berg and Schloßberg. Photo: M. Janišová.

Fig. 2. Hundsheim village, situated at the foothill of Hundsheimer Berg, was first mentioned in historical documents in 1123. Photo: M. Janišová.

Introduction

Over the last few decades, a rapid decline in terrestrial insect biomass has been observed in Central Europe, even in nature-protected areas (Hallmann et al. 2017; van Klink et al. 2020). The rural landscapes of Europe have been fragmented and homogenized (Jongman 2020) and biotic homogenization across various taxonomic groups and a wide range of ecosystems has resulted in significant ecological, evolutionary and social consequences (Olden et al. 2016). Another phenomenon of our modern western civilization is an increased unification of human nourishment. Although we can easily buy tropical fruits all year round, basic foodstuff is standardised: the milk is pasteurized and usually has 3.6% fat content, but with the same poor taste from Rotterdam to Sofia, despite being sold in so many different packs on a single supermarket shelf. Are these facts connected? Or even more dreadful: are the aforementioned drastic declines and unifications consequences of the integrated developments in European agriculture?

The transition from traditional low-input agricultural production to a highly mechanized high-input one, and the industrial agronomy with the main objective of reducing manpower and costs of production have driven us into a cul-de-sac. Here we do not discuss the issue as to whether or not the foodstuff should be produced with the lowest costs possible. Rather, in this article, we intend to focus on the effects of social, political and economic development on landscape and biological diversity. We also would like to question whether the recent direction is correct and necessary. Our countryside has been simplified, homogenized and has lost its liveliness in many places. The animals, that were formerly grazing grasslands during the warmer seasons of the year are now kept in stables and fed with fodder that is produced from arable fields, and, in some cases even on other continents. Turning back the clock is impossible, but a return to the knowledge of our ancestors is necessary. Not surprisingly, interest in traditions and history has grown enormously in recent years. What we have previously left with such ease as being something obsolete, insufficient and unsatisfactory, we now see in a different light. We will return life and diversity to our countryside only if we change the cost-based approach. Today we can still decide what we will eat tomorrow. NOW is the time to re-evaluate our position.

Let's look at the history of a beautiful area in the southwestern tip of the Carpathians; the Hainburger Berge in Austria and the Devín Carpathians in Slovakia. Let's consider whether we have a chance to preserve the natural values of this extraordinary region. Let's find a way out of the cul-de-sac!

Hainburger Berge – a biodiversity hotspot on a crossroads

The Hainburger Berge mountain range (Fig. 1) is located south of the Danube River in Lower Austria and Burgenland (centre at 48.12° N and 16.98° E), only 50 km east of Vienna, the capital of Austria. It is the southern-most part of the Devín Carpathians and the only part of the Carpathian Mountains in Austria. The mountain range, covering only 36 km², is dominated by three hills – Hundsheimer Berg (481 m), Braunsberg (346 m) and Spitzerberg (306 m). These hills represent the last "islands" of larger well-maintained grasslands in the region.

Thanks to its location on a crossroads of human and natural migration routes, on the border of the Alps, the Carpathians and the Pannonian Basin, and also due to a stable and mild climate plus thousands of years of human activity, an enormous diversity of flora and fauna has accumulated in this region (Pokorny & Strudl 1986; Waitzbauer 1990; Englisch & Jakubowsky 2001; Rötzer 2009). The rarest plant species are

dry grassland specialists such as *Dracocephalum austriacum, Stipa pulcherrima, Ranunculus illyricus* and *Adonis vernalis* (all included in the Austrian Red List, see Niklfeld & Schratt-Ehrendorfer 1999 and Anonymus s. d.). They still survive in grasslands on the hills outside the settlements and intensively managed agricultural habitats. The dry grassland habitats are also the habitat for a variety of invertebrates, e.g., over 1,315 butterfly and moth species, which represent one third of the Austrian *Lepidoptera* species pool. In 1965 Braunsberg and Hundsheimer Berg were declared as nature reserves with Spitzerberg following in 1981. In 1989, the European Council listed the three sites as biogenetic reserves and later the whole area became a NATURA 2000 reserve with the name "Hundsheimer Berge". In the territory covering 2,140 ha, ten habitats and six species of European importance occur (Rötzer 2009).

Dramatic changes in agriculture over the last 250 years

As with many areas in the east of Austria, the grasslands of Hainburger Berge were mainly used for sheep grazing in the 18th and early 19th century. Large areas were grazed by sheep, e.g., in 1830, 800 sheep were kept in Hundsheim (Fig. 2), 900 in Bad Deutsch-Altenburg, and 1,010 in Prellenkirchen. Pastures were not only be found on the mountains, but also in wet areas along rivers and near villages. Since then, the pasture area has declined from about 10,000 ha to 111 ha in 2010 (Fig. 3). At the beginning of the 20th century, sheep were gradually replaced by cattle. Grazing came to an end in the 1960's with local farmers changing to pig breeding (Fig. 4). By then, all grasslands in the flat areas had been converted into arable land.

Since 1995, subsidies for the use of high nature value grasslands have been available, but later, the relevant area and, therefore, the sum of subsidies per year was progressively reduced by the authorities, as only grasslands with a set level of agricultural productivity were eligible for subsidies rather than shrublands or rocky areas. Since 2000, nearly all the farms in Hundsheim and the surrounding areas ceased animal husbandry almost completely and concentrated instead on arable farming or wine production. The number of people working in agriculture in Hundsheim continually declined throughout the 20th century from almost 400 in 1934 to only 13 in 2011, resulting ultimately in only 2% of the economically active population (Fig. 3).

Searching the conservation strategy

In the 1970's and 1980's, the Hainburger Berge were studied intensively by botanists and zoologists, and the results confirmed the unique biodiversity of the area and its high importance for nature conservation. A study by the entomologist Wolfgang Waitzbauer (published in 1990) was of especial importance as he proposed a new grazing schedule according to a complex set of rules and a conservation grazing scheme. By chance, two people:

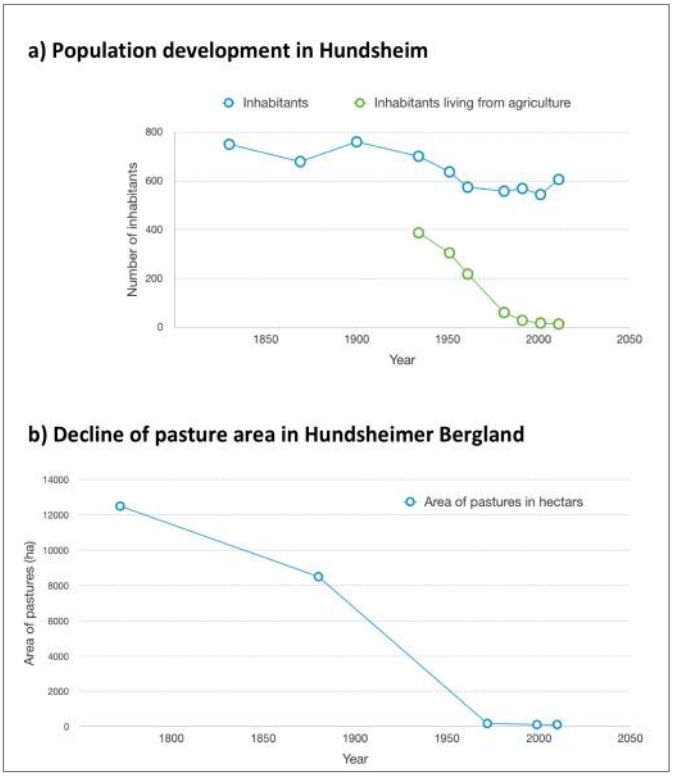

Fig. 3. Hundsheim demography and pasture area. a) Rapid decline in number of people living from agriculture since the beginning of the 20th century (values for the following years are available: 1830, 1869, 1900, 1934, 1951, 1961, 1981, 1991, 2001, 2011). This is a general trend in Central Europe reflecting technological developments and agricultural intensification. These data for the Hundsheim village represent the trends in lowland areas with productive soils at the periphery of the Carpathian Mountains. At higher elevations in the Carpathian upland the decline began later and was region-specific. b) The decline of pasture area in Hundsheim and surrounding area (Hundsheimer Bergland) since the 18th century (values for 1772, 1880, 1972, 1999, 2010) is related to changes in animal husbandry. Sources: Schweikhardt (1832), Waitzbauer (1990), Statistik Austria: Agrarstrukturerhebung (Gemeinde Hundsheim).

Elisabeth and Erich Zillner (originally employed as a secretary and journalist, respectively) were willing to implement this system.

The grazing scheme initiated by the Zillner family started in 1983 after a lengthy period of grassland abandonment (the last-abandoned sites were grazed until 1964, but most sites were abandoned before 1950 due to the very low number of remaining animals (Fig. 5). The Zillners commenced with a "sheep-credit" from the Vienna municipality, with grazing starting at Bisamberg and Cobenzl on the Vienna outskirts. During the optimum period they had 250 ewes, supported by the subsidies over 10-years, but afterwards the area of subsidised grassland was reduced by 30% due to a large

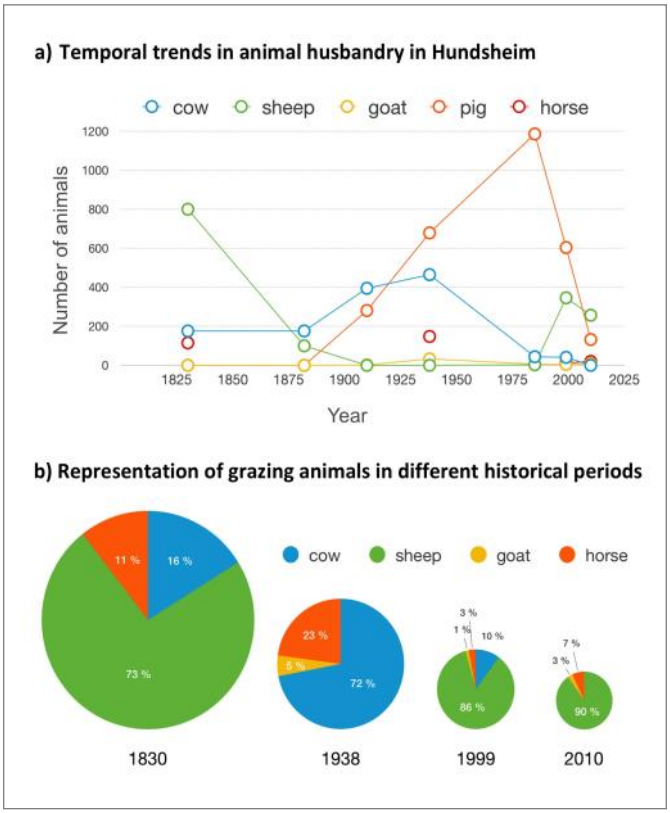

Fig. 4. Trends in animal husbandry in the Hundsheim village since 1825. a) The decreasing numbers of all domestic animals since the 1980's had one exception – the start of sheep breeding by the Zillner family in 1983. Also, after 2010, goat and horse breeding increased, but precise data are not available. Values for following years are shown: 1830, 1882, 1910, 1938, 1985, 1999, 2010. b) Differences in the representation of domestic grazing animals in the Hundsheim village (pigs are not included) in four different years. The size of the pie charts is proportional to the total number of livestock in the village in the particular year. Sources: Schweickhardt (1832), Statistik Austria: Agrarstrukturerhebung (Gemeinde Hundsheim), Österreichisches statistisches Landesamt (1939), Österreichisches statistisches Zentralamt: Viehzählungen (1939), Morent (1987).

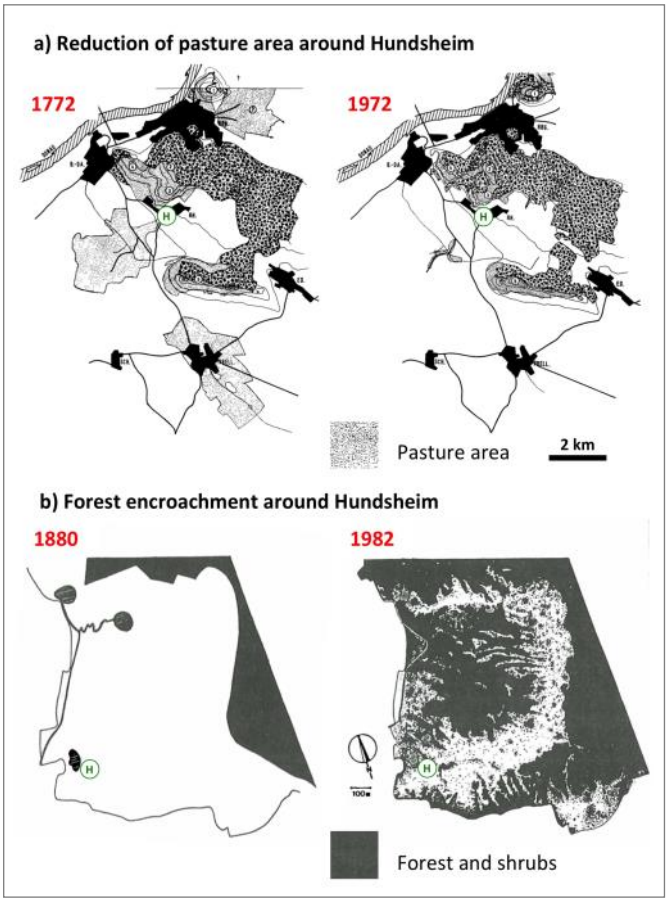

Fig. 5. a) During two centuries (1772–1972) the pasture area around Hundsheim (green H in the maps) has been significantly reduced. b) Over a c. 100-year period (1880–1982) most of the pasture area on the Hundsheimer Berg became overgrown by shrubs and trees. Source: Waitzbauer (1990).

proportion of rocky slopes. As a consequence, the Zillners had to reduce the number of ewes to 120–150. The grazing intensity with 250 animals was confirmed as optimal also by monitoring. The monitoring was undertaken between 2004–2008 by Thorsten English (V-P-N Büro für Vegetationsmonitoring-Populationsökologie-Naturschutzforschung, Vienna, Austria) and three regimes were compared: ungrazed (control), half-intensity grazing, full-intensity grazing. The results were the same for all plant and animal groups except for a particular group of *Hymenoptera*, including wasps, bees and ants, which are unable to move with their nests over larger distances and therefore survive best in ungrazed plots.

Recently, the most important farm products are lamb meat and woollen products. Sheep milk is not produced, as the sheep varieties they use are unsuitable for this purpose, especially when sheep are kept on dry grassland habitats, where the livestock trail is long, and the altitudinal difference is high. In the beginning, the animals had to move from the barn near the village to the pastures on the hill and back down to stable each day as there was no water in the grazing area. Later, a forest road was built which could be used for water transport.

Besides the will and knowledge, a proper flock is needed

The original sheep breed of the region, the "Pressburger Steinschaf" had long since disappeared. It was a local breed of the Steinschaf that had previously occurred across the entire Austrian and Bavarian Alpine areas.

The current mixture of sheep varieties at the Zillners farm originates from Tiroler Bergschaf and Juraschaf. Later crosses with Merino Landrasse improved the wool products due to the more delicate hair of the Merino that does not pierce the quilt (Fig. 6a,b). The Zillner family farm is one of the very few farms in east Austria where wool forms part of their economic base.

Fig. 6. Sheep breeding by the Zillner family. a) Mixing the flock with Tiroler Bergschaf, Juraschaf and Merino-Landschaf created a type of sheep that is perfectly adapted for the area, and they look just like the sheep that were kept here 70 years ago. b) The mixed flock composed of sheep and several goats is ideal for dry grasslands. The animals are efficient in eliminating shrubs and young trees and prevent forest succession. The current flock size in not sufficient to keep all the grasslands open. Twice as many animals are considered optimal for this site. However, sheep numbers are limited by the farm economy. c,d) The electric fences are supported by solar energy and shifted every 1–2 days to another parcel. Photos: M. Janišová.

Erich Zillner's comments about the sheep breed:

"Mixing the flock with Tiroler Bergschaf, Juraschaf and Merino-Landschaf created a type of sheep, that is perfectly adapted for the area, and, as we got to know afterwards, in a funny way it looks just like the sheep that were kept here 70 years ago, approximately from 1940 to 1950."

Formerly, all the sheep suffered from a copper deficiency. The animals were weak and had problems with muscle tone. At that time, it was difficult to identify the reason, as this is not a common problem in Austria (https://www.agric.wa.gov.au/feeding-nutrition/copper-deficiency-sheep-and-cattle). The Zillners introduced a salt lick containing copper and the situation improved. In the past, the local sheep used in dry grasslands might have been adapted for copper-poor nourishment, but adaptation is a lengthy process. In addition, the animals at that time were fed by nutrient-rich hay (and probably also willow branches) from alluvial meadows in winter, which is not the case today.

Grazing practices of the Zillner family

Following the recommendations of Waitzbauer, the pastures on Hundsheimer Berg of about 30 ha were divided into electrically fenced parcels ranging between 0.5 and 2.0 ha. The area was restricted by the wire length and battery capacity. The voltage has to be quite high due to the insulation of sheep wool. As a consequence, Haflinger horses transported the heavy batteries. More recently the Zillners introduced solar panels (Fig. 6c,d).

The sheep flock grazes each parcel for only one or two days and only once during the year. The grazing intensity is thus regulated by parcel size. Each parcel is grazed at different periods during different years, as the grazing is rotated annually including another part of the area. Grazing commences usually at the end of March or the beginning of April and ends in late October or the beginning of November. In the winter period (120–150 days), the sheep remain stabled in the foothills.

One sheep consumes 2 kg of hay or 5 kg of green fodder per day. Shearing is possible twice per year, but according to the Zillners, the optimum frequency consists of three cuts in two years. The wool is used to produce woollen products (flowers, pillows, blankets, toys, table linen) directly at the farm following processing in Belgium.

Sheep breeding – a risky business

As with every enterprise, sheep breeding has its own limits and risks. Recent income of the Zillner family farm consists of three main sources: 50% subsidies, 25% lamb meat, and 25% wool products. Three main factors influence farm prosperity:

- The subsidies for grassland management in the rocky areas have been reduced in the past as the Austrian agro policy supports mainly high production farming. Thus, the family income from subsidies has decreased by about 30%. Moreover, grass production of dry grasslands depends heavily on weather conditions and may be insufficient in years with little precipitation. Therefore, a large buffer area is necessary. However, the management of this buffer area is problematic where conservation subsidies are concerned.
- A statutory check of parasites by a veterinary specialist formerly cost 6–8 Euros per lamb. Following the retirement of the veterinarian in Hainburg, another veterinarian has to come from Fischamed (30 km away from Hundsheim), so that the costs increased up to 25 Euros per lamb due to increased distance and the reduced number of lambs. Moreover, each lamb has to be checked twice - first during a check of the husbandry conditions, and then

Fig. 7. Goat breeding by the Zillner family. a) Goat pasture at the foothill of the Hundsheimer Berg. b) Milking goats using a mobile milking device. c) Goat cheese production. d) The daily milk production of 50 litres can be transformed into 5–6 kg of delicious cheese. Photos: M. Janišová.

again when slaughtered to inspect the carcass for endoparasites. Recently, the high veterinary costs have become one of the most important limiting factors for the family farm.

- Recently, a lack of hay for the winter months has also limited farm development and is a consequence of the increase in arable farming in the region. At the beginning, the Zillners rented 40 ha of alluvial meadows near Marchegg to make hay (400 of 300-kg bales) for their 200 ewes at that time. Later, the landowner, World Wildlife Fund started to use parts of the area as a semi-wild pasture and rented the rest. There was insufficient sources of hay in the vicinity and the transport from remote areas was expensive. The price of hay in the period 2017–2018 was 14–18 cents per kg. As a consequence, the Zillners were forced to reduce the stock numbers. A solution would be a bio farm with rotation on arable fields including alfalfa mown three imes per year with the last mowing being the best nutritional quality for sheep.

Future visions for farm development

In spite of unfavorable economic conditions, the farming activities of the Zillner family are increasing. Since 2015, the next generation – Emanuel Zillner and Ilse Gumprecht – have established a goat farm (Fig. 7a,b) to produce three types of goat cheese for the local market: with Schabzigerklee (*Trigonella caerulea*), with herbs and with spices (7c,d). They also sell yoghurt and fresh milk directly at the farm gate, at markets in Hainburg and Bruck an der Leitha, at specialist outlets in Vienna and by delivery.

They keep a mixed race from Steiersche Scheckenziege, Toggenburger and Burenziege (with hanging ears in some animals). The goats graze the lower parts of the grazing area in order that they are accessible for milking twice a day using a mobile milking device. Goats that are too immature to be milked, can also be grazed on remote pastures on the Königswarte in the eastern part of Hainburger Berge.

Why is the story about Hainburger Berge so important?

The answer is included in a strong statement of Thorsten Englisch: “For me there are two points, which make the story interesting: the first is the high biodiversity here, where the animals, the habitats, are already the hotspots for Austria. The species numbers that you find here, wherever you look, for groups of animals or plants are quite extraordinary. In addition, the habitats are very diverse and interlocking. That is the natural condition. The other is that now you have a person who manages this for 35 years in a way and cares the whole thing that you could never pay, the two people who exploited themselves to achieve the project goal [given by Waitzbauer] (to move because they liked the area itself so much, and because they wanted to do something that contradicted the usual working thought and the consumer world)." (Fig. 8).

On the other side of the Danube River

Similar dry grasslands on the northern banks of the Danube River (the massive of Devínska Kobyla, the Thebener Kogel, in Slovakia) have had a different developmental history since 1918, when the Habsburg monarchy collapsed. Also, the Slovak nature conservationists are aware of the extraordinary nature value of the Devínska Kobyla and the National Nature Reserve was established in 1964. Within its area of 101 km^2, more than 1,100 vascular plant species have been recorded, 82 of them protected by the state (Feráková & Kocianová 1997).

Grazing ceased on the territory of Devínská Kobyla after 1949. In the years between 1950 and 1964, the area was included in the border zone inaccessible to the public. Since 1956, afforestation of grassland habitats started using native and also alien trees, such as *Pinus nigra* (Kaleta 1965; Feráková & Kocianová 1997). After declaring the nature reserve in 1964, all human activities were strictly banned, including grazing, mowing and elimination of woody plants. This initiated undesirable changes in local flora and vegetation (Feráková & Kocianová 1997). Between 1949 and 2011, the grassland area in the nature reserve declined from 85.8% to 38.9% (Hegedüšová & Senko 2011). The reserve became overgrown by shrubs and trees, many of which were invasive exotics.

Thanks to the efforts of the non-governmental organization BROZ (Regional Association for Nature Conservation and Sustainable Development), grazing has been reintroduced to some of the remaining 38 ha of grasslands after a 50-year period without grazing (Fig. 9). In 2012, the organization initiated a LIFE project on “Restoration of NATURA 2000 sites in cross-border Bratislava capital region”.

Andrej Devečka, the ecologist from the BROZ, informed us about their LIFE project in April 2018:

“*We started in 2013 with a flock of 35 goats (Slovak white goat), and it was not easy to buy the goats for the project. In 2017 we had 80–90 goats in two flocks, in 2018 we will keep 105 goats including young animals. We decided on goats because the grasslands are strongly overgrown by shrubs. Another reason was that a young farmer available for the project also preferred goats. He milked them and used half for milk, half for cheese production. The first shepherd recently left for a more manageable site. We have problems in finding a new shepherd. The LIFE project is now over, from now on we will use only the subsidies to cover the costs, only one flock, no milking and no young animals.*”

Expert opinion differs as to what should be done to rescue the valuable dry grassland remnants. The animal farming close to the Slovak capital is not accepted positively by everybody. It is not only about the animal smell and their excrements; people are sometimes shocked by seeing the trampling and disturbance caused by the goat flock. The period when the site was grazed by hundreds of animals (sheep, goats, cattle and horses) is long forgotten. Or maybe some people remember the strong overgrazing by sheep flocks

Fig. 8. Flowering *Adonis vernalis*. Diverse dry grasslands are rich in rare and endangered species such as this species and are a reward for proper grassland management. Spitzerberg in May 2018. Photo: M. Janišová.

Fig. 9. The importance of grazing reintroduction to the National Nature Reserve Devínska Kobyla is clearly communicated to the site visitors through a set of educational panels and instruction leaflets. Photo: M. Janišová.

during the 1950's mentioned by Klement Ptačovský, the Czech botanist (Ptačovský 1959): "The botanical conditions are not the same on both sides of the Danube, the Austrian side is more affected by the Pannonian Basin and has more thermophilous elements which do not occur on Devínska Kobyla. But the vegetation on both Danube sides is very similar. Significant part of the orchards was and still is transformed to vineyards and fields (also some stony slopes with a shallow humus layer, which are evidently not suitable for such purpose). The orchards, meadows and rocky slopes above the Morava River are grazed by such a huge flock of sheep, that there are bare sites without vegetation, or only dry nibbled stalks can be found in some places. The whole slope is endangered by the moving flock (erosion). Many of the transformed and destroyed gardens were localities of the rarest species, especially orchids. Some of the slopes are afforested by alien or native trees. Moreover, the quarry and sandpit are expanded. But the most damage is caused surely by the sheep."

The Slovaks do not have their Zillners, but also not their Waitzbauer. However, the National Nature Reserve and NATURA 2000 site Devínska Kobyla has entered a new stage in its development. The activities in the recent LIFE project evidently improved the situation: the shrubs were reduced, invasive trees were eliminated and the dry grassland species gradually recover.

Conclusion

Finally, the political situation (and the former political, military, and ideological barrier between the "West" in Austria and the "East" in Slovakia) was not a decisive factor for the fate of dry grasslands at the Carpathian-Pannonian crossroads. The change in the way of life has won on both sides of the Iron Curtain, just as it has overcome barriers between continents. It has changed the landscape out of all recognition on both sides of the Danube River. In spite of that, species-rich grasslands can be maintained. There are some people almost everywhere who show us how it can be achieved. Grassland conservation is not about simulating history, maintaining some structures of bygone times and adherence to the disappearing traditions. It is more about people finding a new way of life and new forms of regional high-quality food production. It is clear that the only way to generate a positive contribution to profits is self-marketing of the high-quality products. But nevertheless, a subsidy system that discriminates against agronomic systems that are adapted to the natural environment contrary to intensive farming is highly inequitable. Europe cannot afford to lose completely a branch of agronomy that combines the production of high-quality and healthy food with maintaining landscapes of high nature value.

Author contributions

M.J. planned the research and led the writing, M.M. developed the introduction and the conclusion, H.R. contributed the population and agricultural statistics of the Hainburg area while all authors participated in the interviews and critically revised the manuscript.

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Methods in Grassland Ecology

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Standardised EDGG methodology for sampling grassland diversity: second amendment

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Abstract: The EDGG methodology of sampling multi-scale biodiversity in grasslands and other open habitats is widely applied and has proven to be a highly informative and effective way of recording high-quality data allowing for a multitude of different analyses. Based on our experiences with sampling, storing and analysing such data, here we propose three additions to the protocol: (1) We recommend to record also 1000-m² plots in addition to the hitherto seven standard grain sizes of 0.0001–100 m², as 1000 m² is a standard grain size in many international studies. (2) Recording species cover also for grain sizes larger than 10 m² (where hitherto only presence-absence was recorded) can be done efficiently by noting these values only for the additional species in the larger plot and for those that show a strong deviation from the average of the two 10-m² plots. (3) Finally, sampling biomass is valuable for analyses of the productivity/disturbance and of nutrient limitations. Both aspects can be covered by harvesting aboveground biomass in two random subplots of 20 cm x 20 cm (0.08 m² in total) and fractioning the material into necromass, living bryophytes and lichens, living herbs and living woody species. While Addition 2 hardly requires any additional time and thus should be implemented always, Additions 1 and 3 come with significant additional effort, which normally pays off, but suggests that in case of time limitations they might be restricted to a representative subset of plots in a study.

Keywords: biodiversity monitoring; biomass; cover estimate; EDGG Biodiversity Plot; grassland; multi-scale; nutrient limitation; open vegetation; productivity; scale dependence; standardised sampling; vegetation sampling.

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Introduction

Since 2009, the Eurasian Dry Grassland Group (EDGG) has been conducting annual Field Workshops (Dengler et al. 2009b; Dengler et al. 2016a) to collect standardised multi-scale and multi-taxon biodiversity data of grasslands and other non-forest habitats of the Palaearctic biogeographic realm. The basic concept of sampling was proposed by Dengler (2009), and a detailed protocol was later published by Dengler et al. (2016b). While initially these Field Workshops were focused on dry grasslands in the wider sense, other grassland types have been progressively included over the years, for example, alpine and mesic grasslands in the Field Workshop in Navarre (Biurrun et al. 2014) and a wide range of subalpine and alpine open habitats in the last Field Workshop in Switzerland (Dengler et al. 2020b). The Field Workshops have given rise to a series of regional studies of patterns and drivers of scale-dependent diversity of vascular plants, bryophytes and lichens (Turtureanu et al. 2014; Kuzemko et al. 2016; Polyakova et al. 2016; Dembicz et al. 2021a). Moreover, they together account for the core of EDGG vegetation-plot database GrassPlot (Dengler et al. 2018; Biurrun et al. 2019), which in turn provides the basis for comprehensive studies across the Palaearctic biogeographic realm (e.g. Dengler et al. 2020a; Dembicz et al. 2021b; Zhang et al. 2021). The standardised EDGG sampling approach has been also taken up by various other researchers in dry grasslands (Mardari & Tănase 2016; Talebi et al. 2021), dunes (Torca 2020), salt marshes (Campos et al. 2021), wet grasslands (Jensen et al. 2013) and for a multitude of vegetation types in the biodiversity monitoring program of South Tyrol, Italy (see Hilpold et al. 2020). Altogether this demonstrates how versatile and informative the approach is. In other words, it allows the creation of a set of high-quality data with moderate time effort, which, in turn, support a multitude of different analyses. Based on the experience gained during the Field Workshops and when analysing the data, we regularly refined the methodology (see Dengler et al. 2016b). More recently, a first formal amend-

ment was published, proposing a way to add orthopteroid insects as a fourth taxonomic group to the standard Field Workshop sampling (Hilpold et al. 2020). With this second amendment we want to propose three further additions, some of which were already (partly) implemented during recent Field Workshops: (1) 1,000-m² plots, (2) cover estimates also for larger plots, and (3) modified biomass sampling.

Addition 1: 1,000-m² plots

The GrassPlot database considers 1,000 m² as the eighth standard grain size to be collected in addition to 0.0001, 0.001, 0.01, 0.1, 1, 10 and 100 m² (Dengler et al. 2018; Biurrun et al. 2019). However, in the EDGG Biodiversity Plots (Dengler et al. 2016b) this grain size was not included so far, mainly because of the high sampling effort. Sampling all the grain sizes up to 100 m² in species rich grasslands can take already several hours (pers. observation from Field Workshops), while Dolnik (2003) reported between five and seven hours needed for multi-scale sampling of not particularly species rich grassland habitats of the Curonian Spit up to 900 m² (one well experienced botanist, smaller grain sizes not duplicated as in standard EDGG sampling). In consequence, GrassPlot currently comprises only 187 plots of 1,000 m² (including those of 900 m² or 1,024 m²), while there are 6,321 plots of 100 m² and 10,531 plots of 10 m² (GrassPlot v. 2.10; https://edgg.org/databases/GrasslandDiversityExplorer). Moreover, the currently included plots of that grain size are biased towards species-poor regions and vegetation types (see Fig. 1), preventing reliable richness estimates of that grain size across the Palaearctic. This is particularly unfortunate, as in other widely applied biodiversity sampling methodologies, like Whittaker plots (Stohlgren et al. 1995), the Carolina Vegetation Survey (Peet et al. 2012) and BIOTA Africa (Jürgens et al. 2012), 1,000 m² is one of the main grain sizes. We thus propose to add 1,000 m² as an optional new grain size to the EDGG standard methodology. Because careful collection of all terricolous species in 1,000 m² is time-consuming, and collecting the data in a less comprehensive manner than the smaller grain sizes would be futile, we recommend adding this grain size only for a subset of EDGG Biodiversity Plots. They should be selected in a way that (a) they are representative for the whole range of vegetation types in a study (i.e. not only for those stands that are relatively poorer in species) and (b) the surroundings of the 100-m² plots belong to the same main vegetation type. Both points are only relevant for maximising the utility of the plots within the GrassPlot database. For other purposes, it could make sense to disregard them. We acknowledge that for some vegetation types included in GrassPlot, such as spring vegetation, it might be hard or impossible to find patches that allow sampling of a 1,000 m² plot. To ensure that the smaller plots are on average as representative for the 1,000 m² as possible, one should arrange the largest plot in a way that the 100-m² is in its centre, not in a corner (see Dengler 2009). In Figure 2, we propose how this can be done practically.

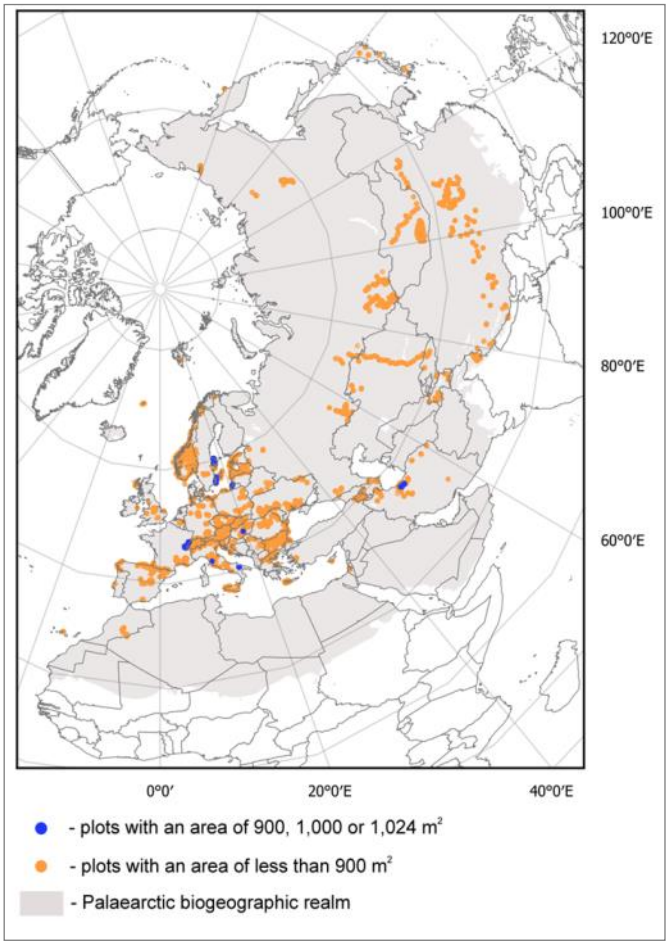

Fig. 1. Distribution of 1,000-m² plots (± 10%) in the GrassPlot database in relation to the distribution of plots of the grain sizes from 0.0001–100 m² (map based on GrassPlot version 2.10).

Addition 2: Cover data also for larger grain sizes

According to standard EDGG sampling (Dengler et al. 2016b), species cover is only recorded for the 10-m² grain size, while for all other grain sizes only presence-absence information is collected. Based on recent paper projects using GrassPlot or the European Vegetation Archive (EVA; http://euroveg.org/eva-database; see Chytrý et al. 2016), we came to the conclusion that it would be highly valuable to have cover values also for other grain sizes. For example, the GrassPlot project #15 of W. Ulrich (pers. comm., see project description at https://edgg.org/databases/GrassPlot) studies species-abundance distributions across scales, but as datasets with cover data across multiple grains are hitherto very rare in GrassPlot, the authors created "virtual" plots of larger size by combining an increasing number of non-adjacent 10-m² plots of the same vegetation type in the same region. While this approach was considered acceptable for this specific question, it is certainly not optimal. EVA projects, on the other hand, often select only for certain grain sizes, and grain sizes of 10 m² and below are often excluded to limit the disturbing effects of varying plot sizes, for example, for classification (Dengler et al.

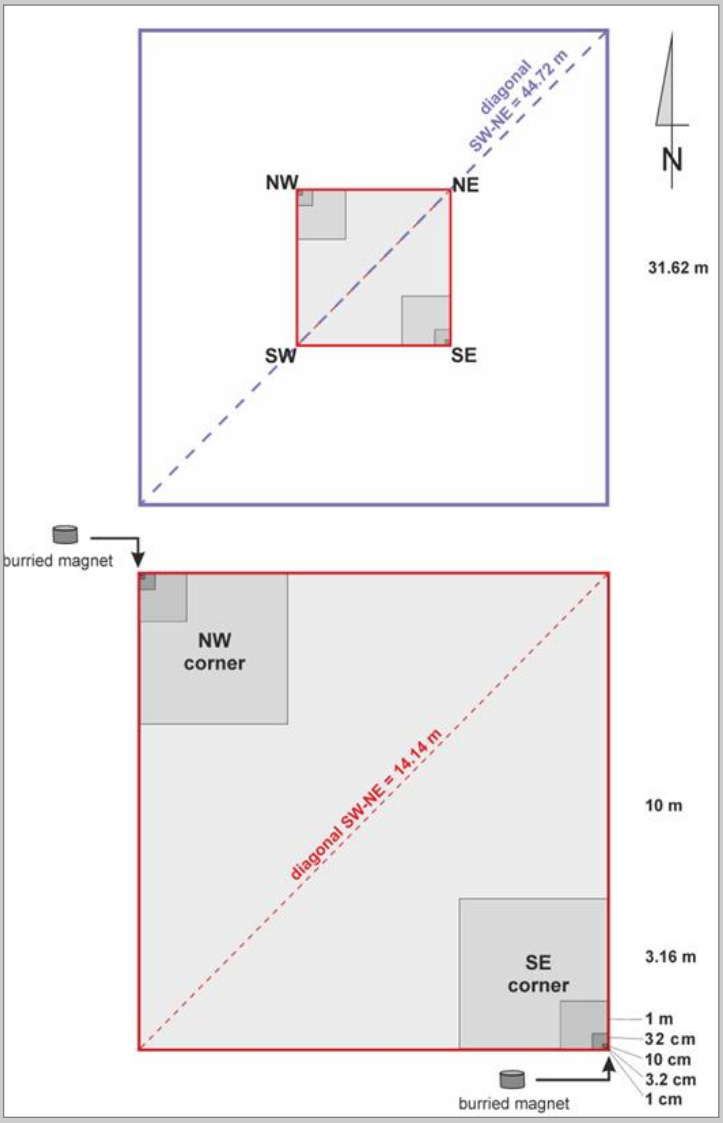

Fig. 2. Proposed arrangement of the 100-m² multiscale-sampling plots with additional sampling of 1,000 m². The delimitation needs one 50-m tape measure, two 10-m tape measures, two folding rules, a coloured string/tape of at least 124 m length, 10 metal pins and four larger pointed poles (from wood or metal). The procedure for setting up the plots is best conducted in the following sequence: Part A (100-m² plot). (1) Mark a suitable starting point with the metal pin, fix the 50-m tape there and direct a person with a compass into NE direction. (2) Mark the position 14.14 m on the tape with a second pin, but without fixing the tape in this corner. (3) Give way to slightly more than 20 m of tape. (4) One person with a third pin pulls the tape at the 10-m position to the NW. (5) Then a person at the NE corner pulls the tape carefully until it reaches exactly 20 m at the NE pin and fixes it there by turning it a few times around the pin. (6) The person at the NW position follows this inward movement, keeps both sides of the tape straight and carefully fixes the pin in the NW corner without disturbing the vertical structure of the vegetation. (7) Steps (3) to (6) are repeated analogously for the creation of the SE corner. Part B (nested subplot series of 0.0001–10 m²). (8) Mark the positions on the 50-m tape that are 3.16 m away from the NW corner with a pin each. (9) Fix the 10-m tape with the first pin at 0 m and the second pin at 6.32 m. (10) Pull the tape at the 3.16 m position inward until both sides are straight and fix it there with a pin. (11) Areas from 0.01 to 1 m² are temporarily laid out with folding rules bound in a 90° angle; areas of 0.0001 and 0.001 m² are normally not laid out at all (because of the disturbance caused at these small scales) – instead the folding rule is just used to measure whether a certain plant individual is inside or not. Part C (1000-m² plot). (12) Now you can remove the 50-m tape from the outline of the 100-m² plot, but keep it fixed in its SW corner (If you have an additional tape available, you can also leave the original tape in its position to keep the visibility of the already sampled parts). (13) Extend the tape in a straight line over the NE corner until 29.43 m (= 14.14 m + (44.72 m – 14.14 m) / 2) are reached, where you fix the large pole (NE corner of 1000-m² plot). (14) Repeat the procedure analogously to create the three other corners. (15) Mark the outline of the 1000-m² plot with the coloured string/tape.

2009a). To allow the usage of EDGG Field Workshop data in such cases, we started to "impute" cover values for the 100-m² grain of EDGG Biodiversity Plots in GrassPlot post hoc (i.e. assign the mean cover of the two 10-m² plots when present in at least one of these and an arbitrarily low value when only present in the remaining 80 m²). While this is a reasonable approximation in most cases, it is hard to decide what the arbitrarily low cover value of the additional species should be (0.1%, 0.01% or 0.001%?) and this approach does not account for the uneven distribution of species in space, even when the plots are selected for relative homogeneity. For the future we therefore suggest a way in which much better cover data for 100 m² (and potentially 1,000 m²) could be achieved with minimal extra effort: one should just estimate the cover at these larger grain sizes for the additional species and for those species where the average of the two 10-m² subplots would be much too high or much too low. To facilitate the cover estimation, we provide here a reference how percentage cover values correspond to filled squares of a certain edge length in case of 10-m², 100-m² and 1,000-m² plots (Table 1). While recording cover for the larger grain sizes in that way comes with very small additional effort, recording cover also for the grain sizes below 10 m² would be more additional time effort (because there all species would have to be estimated) and also less often needed. Therefore, we do not include the latter into the standard EDGG methodology; nevertheless data with such additional information can be included and appropriately stored in GrassPlot database (where they are highly welcome!).

Table 1. Indication of the size of a square (length of one side given in m) to which a certain % cover corresponds for the three given standard plot sizes. Example: 0.001% cover in a 10-m² plot corresponds to a square of 0.01 m (1 cm) fully covered by one plant species.

Plot size	0.001%	0.01%	0.1%	0.2%	0.5%	1%	2%	5%	7%	10%	15%	20%
10 m²	0.01	0.03	0.10	0.14	0.22	0.32	0.45	0.71	0.84	1.00	1.22	1.41
100 m²	0.03	0.10	0.32	0.45	0.71	1.00	1.41	2.24	2.65	3.16	3.87	4.47
1,000 m²	0.10	0.32	1.00	1.41	2.24	3.16	4.47	7.07	8.37	10.00	12.25	14.14

Addition 3: Biomass sampling

Several years ago, Dengler et al. (2016b: C.4) recommended sampling aboveground biomass of representative subplots of defined surface within the 10-m². At that time, we left it open whether it should be a pooled biomass and necromass sample or whether and how it should be fractioned. We also did not give clear reasons why to sample biomass at all. One motivation for biomass data is to use it as a proxy of productivity and (absence) of disturbance. The more living and dead aboveground biomass is there, the higher is the productivity and/or the lower is the disturbance. According to Grime (2001), one should expect a unimodal relationship of species richness to this combined value of biomass. In this respect, it would make sense to pool all aboveground fractions, which is the easiest way of sampling. Another option would be to separate into three fractions already in the field: (a) living vascular plants, (b) living non-vascular plants and (c) necromass. It is a bit more time-consuming, but would also allow us to distinguish between the two dimensions productivity (positively related to peak living biomass in communities dominated by life forms other than phanerophytes) and disturbance (negatively related to necromass). However, recently Wassen (2021) brought another aspect of biomass to our attention: dried biomass is a very effective means to determine the type of nutrient (co-) limitation under which a plant community grows by determining the ratios of different elements (Wassen et al. 2005, 2021). This is much easier than soil analyses (which are impeded by the fact that it is hard to determine which fraction of an element is really available for plants). Contents and ratios of P, N and K can be determined from ground samples of air-dried biomass with standard elemental analysers, not requiring any further treatment in the field (Wassen 2021). The only limitation for that type of analysis is that it requires subsetting to only the living biomass of the non-woody vascular plants, i.e. excluding dwarf shrubs, young phanerophytes, bryophytes, lichens and necromass. Taking both possible analyses of sampled biomass together we now recommend the following procedure:

Aboveground biomass should be sampled in two randomly placed subplots of 20 cm x 20 cm (0.04 m²) within the 10-m² plots applying the rooted presence method and using a scissor or a knife. We are not aware of an established standard of cutting height. Evidently, there is a trade-off between collecting the above-ground biomass as completely as possible and having a big by-catch of non-desired materials, such as soil particles which are heavy and thus could bias the results more than small pieces of missing stems. We recommend that researchers apply a pragmatic solution, which might be approximately 1 cm above soil surface. In the field, the biomass should be split into the four fractions (i) necromass (litter + dead wood), (ii) living bryophytes and lichens, (iii) living herbs and (iv) living woody species (dwarf shrubs and young phanerophytes). During the expedition the biomass should be air-dried and prior to analysis dried at 65 °C to constant weight. The four fractions should then be weighed and recorded as dry mass per m². Fraction (iii) should be ground and then used for determination of elemental contents and ratios. If the sampling of biomass should be too time consuming for all plots of a Field Workshop (or another project), we recommend to do it only in one of the corners of the EDGG Biodiversity Plots and in a random subset of the normal plots. Biomass sampling should preferentially be done around the annual peak biomass, and not shortly after a severe disturbance event (mowing, intensive grazing, fire).

If sampled during 2021, M. Wassen (pers. comm., see Wassen 2021) would generally be interested in receiving the (iii) samples for a pan-Palaearctic project and then conduct the lab analyses. If interested in this offer, please contact him beforehand (m.j.wassen@uu.nl).

Conclusions and outlook

In this article we propose three potential additions to the EDGG standard sampling methodology. They are inspired by the general philosophy of this approach (a) to base every methodological step on careful considerations and not on blindly following traditions, and (b) to counterbalance additional time effort vs. gained additional information. While we consider all three elements as optional, we are convinced that in most cases the additional efforts (meaning the reduced number of plots that could be sampled) is more than compensated by additional analytical options gained. In Appendix S1 in Supporting Information we provide an updated form to incorporate the three additional elements in field recording.

While Addition 2 comes with almost negligible additional effort, Additions 1 and 3 have significant additional effort. Therefore, in case of Addition 1 and possibly also Addition 3, we recommend implementing them only for a subset of plots. If you opt for this solution, however, it will be crucial that you do this for a representative subset. We hope that this second Amendment to the EDGG sampling methodology (Dengler et al. 2016b) after Hilpold et al (2020) will be followed widely and prove to yield important additional insights. Being involved in many broad-scale analyses using plot data, we will continue to observe needs for analyses,

and, if we find a certain modification or addition to have a good cost-return ratio propose them in future amendments.

Author contributions

All three authors are jointly involved in the organisation of EDGG Field Workshops and in the governance of the GrassPlot database. J.D. had the idea of the paper and drafted the manuscript, I.D. prepared the figures, while I.B. and I.D. revised and augmented the text.

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Supporting Information

Appendix S1. Updated recording form for EDGG Biodiversity Plots.

Photo Competition

Best Shots on "Grassland lights"

Here are the three winners of the EDGG Photo Competition!
The Jury for the Photo Competition was composed of Edy Fantinato, Magdalena Firganek-Fulcher, Anna Kuzemko, Rocco Labadessa, Jim Martin, Jalil Noroozi and Salza Palpurina.

1st place

***Fritillaria meleagris* in semi-natural wet hay grassland in Katerynopil, Cherkassy region, Ukraine. 25 April 2021.**
Canon PowerShot SX50 HS, Time 1/160 sec., f/5.6, ISO 125.

Kateryna Zhulenko
lavrinenkokaterina97@gmail.com

Reviews from the Jury:

"The Fritillaries are lit up like mini lamps within the grassland. A fantastic composition."

"The light reflected on the two beautiful Fritillaria plants make them glow as night lights—what a literal expression of "Grassland lights"! Also, the light enhances their delicate stature. I like the photo also from a compositional point of view because it has a great depth to the whole field of flowers, with the focus only on the two "night lights" in the centre."

2nd place:

Leopoldia comosa **near the village of Jarczów (Lublin province, SE Poland). 26 June 2020.**
Sony A7II, Meyer-Optik Goerlitz Trioplan 50mm f/2.9 manual focus lens (+extension tubes).

Piotr Chmielewski
pchmielewski4@wp.pl

Reviews from the Jury:

"I appreciate the bold lack of focus here—despite the lack of focus on the plant (or just because of it), the shining morning dew looks like a myriad of watery pearls"

"At a first sight, one might think that the subject is Muscari comosum. Nothing more wrong! The plant is indeed out of focus; the real subject is the light reflected by the dew drops."

3[3d] place:

***Stipa pennata* aggr. in a subalpine semi-dry grassland in Zermatt, Switzerland. The photo was taken in the evening not much before the sun disappeared behind the surrounding mountain ridges.**
Nikon D500, Nikon AF-S Micro Nikkor 105 mm 1: 2.8 G ED. F79, 1/200 sec ISO 100.

Jürgen Dengler
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Reviews from the Jury:

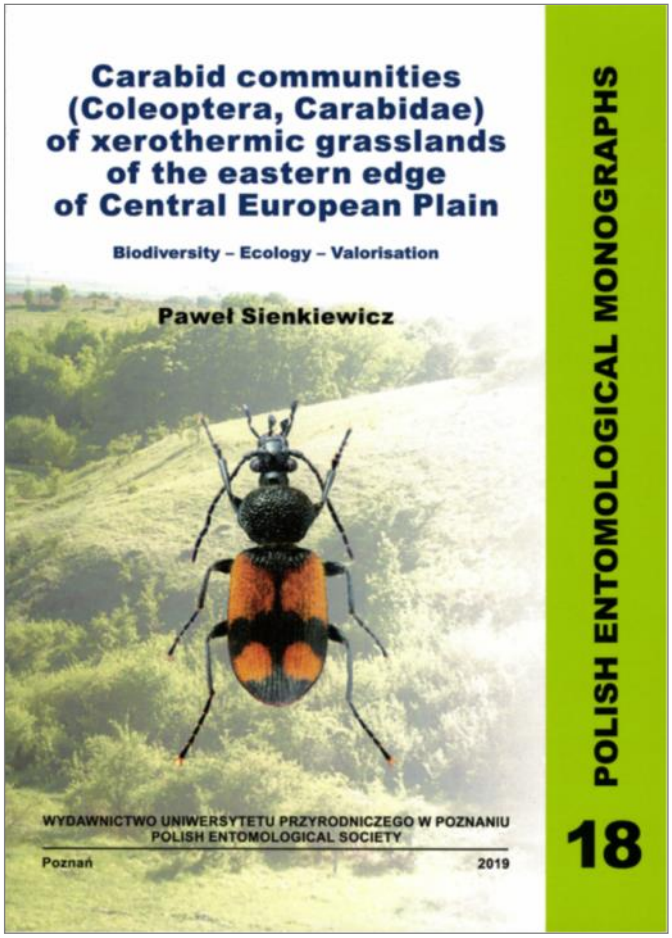
"I love the way the different species cascade across the photo with the light reflecting off them. A wonderful diversity of species and colour."

"At a first sight, grasslands might appear as homogeneous stands of indiscriminable plants. In this picture the photographer took advantage of the light angle to reveal the variety shapes that characterise grasslands."

Book Review

DOI: 10.21570/EDGG.PG.49.30-31

Sienkiewicz, P. 2019. Carabid communities (Coleoptera, Carabidae) of xerothermic grasslands of the eastern edge of Central European Plain – Biodiversity – Ecology - Valorisation. – Polish Entomological Monographs 18, Poznan. 195 pages, 16 colour plates, 48 Figures, 18 Tables, 21 distribution maps, data on traits of 160 species. ISBN 978-83-7160-925-1; ISSN 1641-7445 – Price €30, available from the Polish Entomological Society http://pte.au.poznan.pl/ contact info: ptent@up.poznan.pl



Carabid beetles have been popular as a study taxon since the earliest days of the development of the discipline of entomology. Lindroth (1992) used this taxon for major studies on biogeography in the 1940s, and following a symposium hosted at Wageningen by Den Boer (1971) in 1969, there has been an ongoing and active tradition of carabidological research in Europe (Kotze et al. 2011). However, whilst there is a huge amount of published literature on carabid beetles, particularly those of forest (e.g. Koivula et al. 2019) and agricultural (e.g. Saska et al. 2019) habitats, currently there is very little published literature on the carabid assemblages of grassland habitats, even though their assemblages are highly diverse and speciose. For those interested in these communities, Sienkiewicz also provides a list of mostly recent literature on the carabid beetles of xerothermic grasslands.

Sienkiewicz's book is based on four years of empirical research on the carabid communities of flowering and stipa xerothermic grassland habitats in northwest Poland. The study area encompasses an area bounded by the valleys of the Odra, Toruń-Eberswalde, Noteć, Warta and Vistula rivers. Information on the phytosociological classification of the sites according to Matuszkiewicz (2012) is provided, which is very helpful for researchers considering associations between vegetation and carabid species. The book also includes colour plates of the main habitat types of the study sites. The introductory chapters also provide a good summary of the biogeography of xerothermic grasslands in NW Poland and their conservation status.

The book is written in the format of a scientific study, with a set of hypotheses on the carabid assemblages of xerothermic grasslands, with full details of the Materials and Methods, and results of analyses. These are based on a set of hypotheses on the carabid assemblages of xerothermic grasslands. Probably the most valuable element of this book for many readers will be the overview of carabid species recorded in this study, which provides information on all 160 recorded species, including the sites where they were recorded, frequency, distribution and habitat preferences. There is also a comprehensive table containing a summary of trait information, such as body size, dispersal power, development type, and habitat, moisture and dietary preferences, which will also be a valuable resource of information for researchers.

The analyses did not generate clear distinctions between characteristic carabid assemblages of the habitats and vegetation types studied, though there were effects of geographical location. It was assumed that there would be an association between the carabid species composition and the vegetation type but this was not evident, though there were distinct differences between the assemblages of flowering grasslands and stipa grasslands, probably due to differences in habitat structure and microclimatic conditions. One possible reason for this result is that the environmental conditions of these habitats cover a broad range of extremes regarding temperature and moisture, for instance. There were, however, clear differences between the carabid assemblages of xerothermic grasslands and other open grassland habitats, such as agricultural fields. It was clear that xerothermic grasslands are highly important for the conservation of carabid diversity, including many stenotopic and xerophilic species.

On a critical note, there were a considerable number of typos, though the text is still clear and easy to follow. Also the row-headings in one of the tables were upside down, which

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Book Review

is a little inconvenient. The title of this book led me to expect something more of a reference book on carabid communities of xerothermic grasslands rather than a report of a research study. I hope that such a book maybe forthcoming by the author of this work. None of these faults detracts from the potential value of this work, however, and the book really contains a great amount of interesting information on the topic of carabid communities. I do not hesitate to recommend it to anyone interested in the carabid communities of xerothermic grasslands.

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Grasslands in Kotlina Zamojska basin, SE Poland. Photo: P. Chmielewski.

Book Review

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Prach K., Walker L.R. 2020. Comparative plant succession among terrestrial biomes of the world. Cambridge University Press, Cambridge, 399 pp., ISBN (paperback): 9781108460248 - £34.99, ISBN (ebook): 9781108561167 - $36.00.

The temporal changes of vegetation have fascinated botanists and ecologists for more than a century and the study of these processes supported the emergence of important schools of vegetation and plant ecology (Hagen 2010; Prach & Walker 2019). The study of cyclical vegetation changes from year-to-year or the study of differences in establishment success of short-lived species by unpredictable changes in the abiotic conditions and weather labelled as fluctuation seems to be "very easy" compared to the study of succession (i.e. a rather long-lasting, more or less directional process of replacement of plant species and communities following a natural or anthropogenic disturbance).

While both the speed and direction of compositional changes are quite specific to site history and strongly influenced by the acting disturbance regime, local climate and species pool of the surroundings, a comparative overview of successional processes in different parts of the world is very timely. Aware of this need, world-leading eminent scientists of plant succession and restoration ecology found enough time to compile a book dealing with these aspects.

Prach & Walker's book "Comparative plant succession among terrestrial biomes of the world" is divided into three parts. After a short introduction to the historical development of successional theory, the first part introduces each of the terrestrial biomes, including a short description of their physiognomy and distribution, macroclimate and seasonality, abiotic conditions, biota, natural disturbances and human impact. Each biome's description is supplemented with a schematic map of its distribution. This section provides especially useful material for university teaching. In the second part, the authors introduce the 10 most important disturbance types in detail ranging, with increasing human influence, from completely natural (volcanos, glaciers, cyclones) to completely anthropogenic (clear-cuts, ploughing or mining). The authors tried to compare succession by disturbance types across biomes with a comparative analysis of change in vegetation patterns and ecosystem processes. One of the most valuable aspects of the book is that the authors analysed patterns and processes based on a huge number of case studies and available datasets from several decades and regions and tried to compare these datasets with each other to test theoretical considerations and findings from the literature. In the third part, the authors try to give an overview synthesis and introduction to the current state of succession research, but also provide guidelines and underline the crucial points where successional theory and research can support restoration of natural communities across series and biomes.

The book is supplemented with many in-text figures and tables which are highly informative and support well the understanding of the text. The book also has colour plates illustrating some vegetation types and successional pathways. I found, however, the layout of the colour plates very strange as they were arranged so that each half-page sized illustration was placed alone in a single page.

To sum up, it is a well-organised, very useful book with a very rich literature base (nearly one hundred pages of references included!). It provides a host of ideas that are very inspiring for research and a solid and up-to-date overview of the subject. It can greatly support teaching of specific subjects in vegetation and plant ecological theory. With clear links to practical restoration, it also provides a nice overview of how spontaneous succession may support, or in some cases delay/hinder restoration activities. By identifying gaps and areas for further research the authors clearly demonstrate, in agreement with Meiners et al. (2014) and my personal view, that succession research hasn't reached its climax.

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Recent Publications of our Members

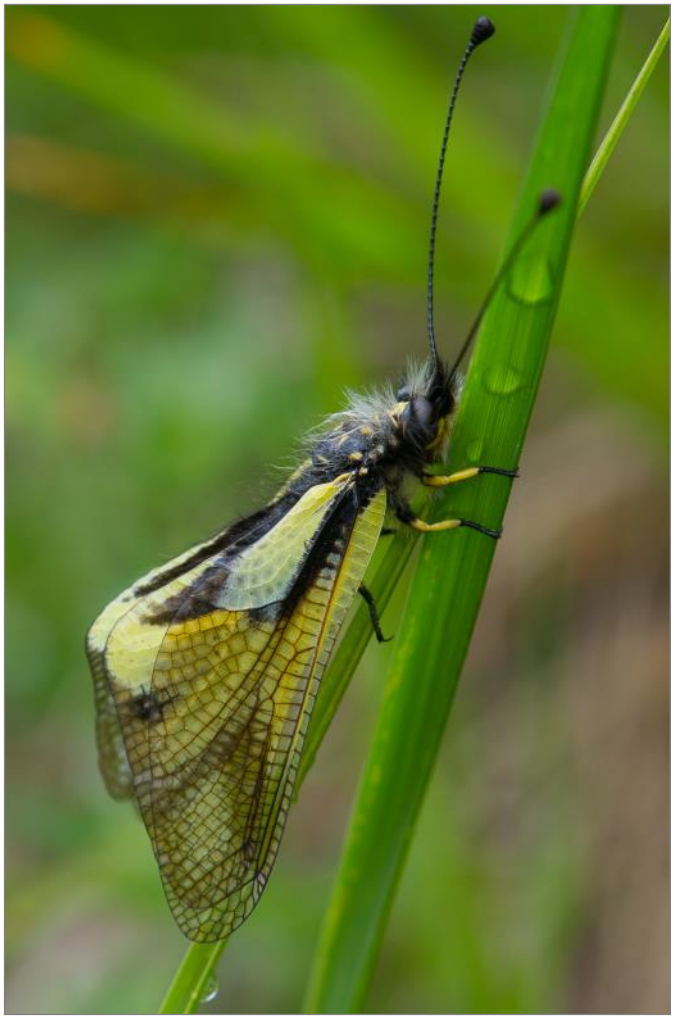
In this section, the contents of which will also be made available via our homepage, we want to facilitate an overview of **grassland-related publications** throughout Eurasia and to improve their accessibility. You are invited to send lists of such papers from the last three years following the format below to Iwona Dembicz, i.dembicz@gmail.com. We will include your e-mail address so that readers can request a pdf. For authors who own full copyright, we can also post a pdf on the EDGG homepage.

Classification

Willner, W., Biurrun, I., **Dengler, J**. & Jansen, F. 2021. Vegetation Classification and Survey: the first year. *Vegetation Classification and Survey* 2: 1–4.

Biodiversity & Ecology

Boonman, C.C.F., Santini, L., Robroek, B.J.M., Hoeks, S., Kelderman, S., **Dengler, J.**, Bergamini, A., Biurrun, I., Carranza, M.L., Cerabolini, B.E.L., Chytrý, M., Jandt, U., Lysenko, T., Stanisci, A., Tatarenko, I., Rūsiņa, S. & Huijbregts, M.A.J. 2021. Plant functional and taxonomic diversity in European grasslands along climatic gradients. *Journal of Vegetation Science* 32: e13027.



***Libelloides coccajus* in Sumvitg, Grisons, Switzerland. Photo: J. Dengler.**

Sporbert, M., Welk, E., Seidler, G., Jandt, U., Aćić, S., Biurrun, I., Campos, J.A., Čarni, A., Cerabolini, B.E.L., Chytrý, M., Ćuštarevska, R., **Dengler, J**., De Sanctis, M., Dziuba, T., Fagúndez, J., Field, R., Golub, V., He, T., Jansen, F., Lenoir, J., Marcenò, C., Martín-Forés, I., Erenskjold Moeslund, J., Moretti, M., Niinemets, Ü., Penuelas, J., Pérez-Haase, A., Vandvik, V., Vassilev, K., Vynokurov, D. & Bruelheide, H. 2021. Different sets of traits explain abundance and distribution patterns of European plants at different spatial scales. *Journal of Vegetation Science* 32: e13016.

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Conservation and Restoration

Axmanová, I., Kalusová, V., Danihelka, J., **Dengler J**., Pergl, J., Pyšek, P., Večeřa, M., Attorre, F., Biurrun, I., Boch, S., Conradi, T., Gavilán, R.G., Jiménez-Alfaro, B., Knollová, I., Kuzemko, A., Lenoir, J., Leostrin, A., Medvecká, J., Moeslund, J.E., Obratov-Petkovic, D., Svenning, J.-Ch., Tsiripidis, I., Vassilev, K. & Chytrý, M. 2021. Neophyte invasions in European grasslands. *Journal of Vegetation Science* 32: e12994.

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Forthcoming Events

50th Annual Meeting of the Ecological Society of Germany, Austria and Switzerland
30 August 2021 – 3 September 2021, Braunschweig, Germany
Conference website: https://www.gfoe-conference.de/

International Symposium in honor of Salvador Rivas Martínez
1–3 September 2021, León, Spain
Conference website: https://simposiosalvadorrivasmartinez.com

29th Meeting of the European Vegetation Survey (EVS) Revegetating Europe - contributions of the EVS to the ecological restoration decade
6–7 September 2021, Virtual event
Conference website: http://www.evs2020roma.info/#about-6

12th European Conference on Ecological Restoration SER 2021
7–10 September 2021, Virtual event
Conference website: https://www.sere2021.org/

1st Congress of the Spanish Botanical Society (SEBOT) 2nd Congress of the Spanish Society for Geobotany (SEG)
8–10 September 2021, Toledo, Spain
Conference website: https://www.congresosebot2021toledo.com

63th Symposium of the International Association for Vegetation Science (IAVS)
20–23 September 2021, Virtual event
Conference website: https://mailchi.mp/8c86a444fe50/63rd-iavs-symposium-vegetation-goes-virtual-4948622?e=6d90b81f54

Ecology Across Borders 2021
12–15 December 2021, Liverpool, UK
Conference website: https://www.britishecologicalsociety.org/events/bes-annual-meeting-2020/ecology-across-borders-2021/

30th International Congress for Conservation Biology (ICCB) 2021
12–16 December 2021, Kigali, Rwanda
Conference website: https://conbio.org/mini-sites/iccb-2021

Conference on Grasslands of Asia
February 2022, Virtual event

EDGG Field Workshop "Latitudinal transect in Ukraine"
May 2022, Ukraine

Eurasian Grassland Conference (EGC) of the EDGG
September 2022, Tolosa, Spain

Mountain hay meadow in Preda, Grisons, Switzerland, with *Cirsium helenioides, Silene vulgaris, Lathyrus pratensis* and *Vicia cracca*. Photo: J. Dengler.

EDGG on the web:
http://www.edgg.org

EDGG in Facebook:
https://www.facebook.com/groups/938367279561202

The Eurasian Dry Grassland Group (EDGG), founded in 2008, is a working group of the International Association for Vegetation Science (IAVS) and member of the European Forum on Nature Conservation and Pastoralism (EFNCP). On 30 April 2021, it had 1347 members from 64 countries.

The **Eurasian Dry Grassland Group (EDGG)** is a network of researchers and conservationists interested in any type of Palaearctic natural and semi-natural grasslands. It is an official Working Group of IAVS (http://www.iavs.org) but one can join our group without being an IAVS member. We live from the activities of our members. Everybody can join the EDGG without any fee or other obligation.

The EDGG covers all aspects related to grasslands, in particular: plants - animals - fungi - microbia - soils - taxonomy - phylogeography - ecophysiology - population biology - species' interactions - vegetation ecology - syntaxonomy - landscape ecology - biodiversity - land use history - agriculture - nature conservation - restoration - environmental legislation - environmental education.

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Dactylorhiza majalis **in Struthwiese, Germany. Photo: S. Dullau.**