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# PALAEARCTIC GRASSLANDS

Journal of the Eurasian Dry Grassland Group

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## Palaearctic Grasslands

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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 usually appears in four issues per year. *Palaearctic Grasslands* publishes news and announcements of EDGG, its projects, related organisations and its members. At the same time it serves as outlet for scientific articles and photo contributions.

***Palaearctic Grasslands*** is sent to all EDGG members and, together with all previous issues, it is also freely available at http://edgg.org/publications/bulletin.



**Scientific articles** (Research Articles, Reviews, Forum Articles, Scientific Reports) should be submitted to Jürgen Dengler (juergen.dengler@uni-bayreuth.de), following the Author Guidelines updated in this issue of Palaearctic Grasslands (see page 4). They are subject to editorial review, with one member of the Editorial Board serving as Scientific Editor and deciding about acceptance, necessary revisions or rejection.

**All other text contributions** (News, Announcements, Short Contributions, Book Reviews,…) should be submitted to Anna Kuzemko (anyameadow.ak@gmail.com) AND Idoia Biurrun (idoia.biurrun@ehu.es). Please check a current issue of *Palaearctic Grasslands* for the format and style. Deadline for submission to the next issue is **15 April 2020**

**Photo and art contributions** (for general illustrative purposes with captions; proposals for Photo Stories; contributions to Photo and Art Competition) should be submitted to Photo Editor Rocco Labadessa (rocco.labadessa@gmail.com). Deadline for submissions to the next Photo Competition on "Managing grasslands" is **15 April 2020**.

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).

Photos included in submissions have always to be delivered in two forms, embedded in the document and as separate jpg (or tiff) files with sufficient resolution for printing (i.e. not less than 1 MB).

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

# Editorial Board



**On front cover page:** ***Crocus heuffelianus,*** **Apuseni National Park, Romania. Photo: O. Valkó.**

# *Editorial*

Dear readers,

Due to an incredibly warm winter throughout the Palaearctic biogeographic realm (regionally January temperatures were 6 °C above long-term average), some individuals of grassland plants started already in January or February with flowering, even in the mountains (e.g. *Gentiana verna*, *Potentilla verna*, *Tragopogon pratensis*). So it probably will not take long until spring will colour the grasslands in full intensity as on our cover image. To bridge the time until the onset of spring, we prepared a volume of *Palaearctic Grasslands* rich in content, actually it is the longest volume so far. Most importantly, you will find the full call for the 17th Eurasian Grassland Conference in Tolosa, Spain, in September 2020, where we hope to meet many of you (p. 6). Moreover, there are four scientific articles, highlighting that PG becomes more and more accepted as scientific publication outlet and not only as EDGG newsletter. Two of the articles provide preliminary results of the recent EDGG Field Workshops of the inneralpine dry valleys of Austria (p. 34) and Switzerland (p. 59), one analyses park grasslands in Ukraine (p. 25) and one deals with the Emerald Network of Ukraine, which contains many extraordinary grassland landscapes (p. 89).

Last but not least, we would like to highlight three issues on behalf of the journal: (i) We have now clarified that all content in PG is open access, but with a specific Creative Commons license (p. 4). (ii) We made some minor adjustments to our Author Guidelines, whose complete version you find on our website (p. 4). (iii) PG depends on your photo submissions (for Photo Competitions, for Photo Stories, or for general illustrative purposes) to provide an attractive and diverse journal to you (p. 5). This time, the Photo Competition (p. 94) was quite successful with a considerable number of contributions, so thank you for that! We hope that this enthusiasm will continue for the next issues.

***Jürgen Dengler,*** *Deputy Chief Editor*

**A sunny winter day in a grassland in Switzerland. Photo: J. Dengler.**

# News

## EDGG events 2021 and 2022 approved

Recently the EDGG Executive Committee has discussed the Eurasian Grassland Conferences and the EDGG Field Workshops of the next years. We are glad to announce that we have exciting offers for both of our annual events for the years 2021–2024. We formally approved the following four events, whose organisers are now starting with the preparation:

**18th Eurasian Grassland Conference: summer 2021 in Hungary**, hosted by Péter Török and team

**19th Eurasian Grassland Conference: late summer 2022 in Bolzano**, Italy, hosted by Andreas Hilpold and team

**15th EDGG Field Workshop: summer 2021 in South Tyrol (Vintschgau, Veltlin, etc.), Italy**, hosted by Andreas Hilpold and team

**16th EDGG Field Workshop: summer 2022 in Picos de Europa, Northern Spain**, hosted by Amparo Mora and team

As soon as precise dates and more information is available, we will provide them in the EDGG media.

***EDGG Executive Committee***

## Creative Commons license for *Palaearctic Grasslands*

*Palaearctic Grasslands* was always intended by us as an open access publication, but we realised that it was not clear to authors and readers which copyright rules should apply, in particular as in the imprint of the issues up to now there was contradictory information.

Resulting from our internal discussions, we conclude that a Creative Commons (see https://creativecommons.org) license **CC-BY-SA 4.0** is the appropriate one for all content (text, photos, figures, tables) in Palaearctic Grasslands. From this volume onwards, we indicate this explicitly in the imprint (for the whole volume) and on the first page of each longer item that has a digital object identifier (DOI). Our understanding is that this same license also applies to all content of volumes No. 1–44.

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***The Chief Editor Team (Idoia Biurrun, Jürgen Dengler & Anna Kuzemko) together with Rocco Labadessa***

## Changes in the Author Guidelines of *Palaearctic Grasslands*

Based on experiences with recent article submissions, we have adopted a few minor changes and clarifications in the Author Guidelines, including:

- Text must be in **British English** throughout (not American English). Please set your spell-checker accordingly.
- **Numbers must be given with a reasonable precision** only and all values for the same parameter with the same precision.
- **Synoptic vegetation** tables must be based on **percentage constancies**, not on constancy classes, nor on phi-values. Phi-values x 100 (but without decimal places) can be provided as supplementary information only.
- Be aware that for review you should embed all figures into the text, but after acceptance you need to provide **each photo and other figure as separate file** to the Chief Editor because embedded figures cannot be extracted in good quality.

You find the complete, updated Author Guidelines for download on the website of the journal (https://edgg.org/publications/bulletin).

***The Chief Editor Team (Idoia Biurrun, Jürgen Dengler & Anna Kuzemko)***

# Call for the new Photo Competition "Managing grasslands" and Photo Story

The call for the new **Photo Competition** is dedicated to the theme "**Managing grasslands"**, looking for photographs that best highlight the multiple role and the effects of traditional management activities (e.g. grazing, mowing) on biodiversity and structure of semi-natural grasslands.

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 information on the subject (species name, date, place name) and, possibly, technical details (camera, lens, aperture and exposure time).

The selection will be made by a jury of at least five members from the Editorial Board of the journal. The three best shots will be awarded with full space in the next issue, but we reserve the right to use further submitted materials for illustrative purposes in other parts of the issue.

If you feel you can contribute with your shots, don't be shy! Everyone can join the competition!

Contributions 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 for 1-4 pages and the proponents should already propose a preliminary layout (in PDF or MS Word format), which will be finally typeset by Editors. As an example, you may take a look at the Photo Stories published in previous PG issues.

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

Deadline for photo submissions is **15 April 2020**!

***Rocco Labadessa*****,** Bari, Italy
rocco.labadessa@gmail.com

**Horses in Northern Caucasus, Karachay-Cherkess Republic. Photo: O. Demina.**

## EDGG Event

DOI: 10.21570/EDGG.PG.45.6-20

# EGC 2020

# 17th Eurasian Grassland Conference

# Tolosa, Spain

# 7-13 September 2020

# *Grassland dynamics and conservation in a changing world*

# Second Call

**View of Tolosa. Photo: I. Salcedo.**

17th EGC focuses on global change as one of the major drivers of grassland biodiversity and productivity, with special sessions devoted to global change, succession and urban grasslands. The conference aims to bring together and connect he latest research with practical management and policy, and thereby contribute to the sustainability of natural and semi-natural grasslands and their animal and plant resources. As in previous years, we offer opportunities for the exchange of information during our standard talk and poster sessions, as well as the mid-conference excursion to the Aizkorri-Aratz Natural Park. In addition, we offer a *Meet the Editors Workshop* and a *Workshop on Orthoptera*. Furthermore, we will host three inspiring keynotes. We cordially invite all grassland researchers and conservationists to join us in Tolosa!

## Programme

This year's conference offers three keynote talks, two optional workshops and an optional post-conference excursion, in addition to the talk and poster sessions, mid-conference excursion and grassland party. On 7th September, participants have the opportunity to participate in two workshops: i) *Meet the Editors* of high impact ecology and vegetation journals, ii) workshop on *Orthoptera*, led by Rocco Labadessa. We welcome Alfonso San Miguel, Monika Janišová and Frank Yonghong Li as our keynote speakers. The mid-conference excursion will take us to Aizkorri Natural Park, and a three-day optional post-conference excursion will take place mostly in Navarre (11–13th September). This region is located at the intersection of three biogeographic regions: Atlantic, Mediterranean and Alpine. The

**Please register at http://www.edgg.org/egc2020**

**Deadline: 1st May 2020**

participants will have the opportunity to see grassland landscapes of those biogeographic units, and learn about their flora and fauna, as well as grassland use. Below you will find the preliminary programme. To find more information, please visit the conference web site: www.edgg.org/EGC2020 .

***Preliminary programme***

| | |
|---|---|
| **7th September** | **Workshops, registration** |
| 12:00-17:30 | Introduction to *Orthoptera* (lunch in between, after the room session) |
| 17:30-18:30 | Meet the editors |
| 18:30-20:00 | Registration and welcome drink |
| **8th September** | **Talks and Poster Sessions I and II** |
| 8:00-9:00 | Registration |
| 9:00-9:20 | Opening ceremony |
| 9:20-10:20 | Keynote lecture by Alfonso San Miguel |
| 10:20-11:30 | Talks and posters, with coffee break at 11:05 |
| 13:30-15:00 | Lunch in Zerkausia (see map) |
| 15:00-16:00 | Keynote lecture by Monika Janišová |
| 16:00-19:00 | Talks and posters, with coffer break at 17:00 |
| 19:00 | Touristic tour |
| **9th September** | **Mid-Conference excursion, Grassland Party and Auction** |
| 8:00 | Departure of buses from Navarra bridge (see map) |
| 19:00 | Grassland Party in Arantzazu with Auction |
| 22:00 | Departure of buses from Arantzazu to Tolosa |
| 22:30-22:45 | Arrival at Tolosa |
| **10th September** | **Talks and Poster Sessions III and IV** |
| 9:00-10:00 | Keynote lecture by Frank Yonhong Li |
| 10:00-13:30 | Talks and poster, with coffee break at 11:00 |
| 13:30-15:00 | Lunch in Zerkausia (see map) |
| 15:00-17:45 | Talks and posters, with coffee break at 16:45 |
| 17:45-19:00 | General Assembly and Closing Ceremony |
| **11-13th September** | **Post-conference excursion (optional, max. 40 people)** |
| 11 September, 8:00 | Departure from Tolosa (Navarra bridge) |
| 13 September, 20:00 | Arrival at Biarritz (hotel with shuttle to airport) |

***Sessions***

Global change is one of the major threats of natural and semi-natural grasslands, which are facing important challenges for their conservation, caused by land-use and climatic change. The 17th EGC aims to improve our knowledge of the diversity and management of Palaearctic grasslands in face of global change. Palaearctic grasslands are among the most threatened in the world, and include both natural grasslands (mainly alpine grasslands and steppes) and semi-natural grasslands used for animal husbandry. Due to several factors - land-use abandonment and intensification being the strongest - these grasslands have declined in extent, integrity and diversity. Their conservation is crucial, as Palaearctic grasslands account for almost 40% of the World's grasslands, and exhibit global maxima for small-grain plant species richness.

The conference intends to emphasize the following topics in focused sessions:

**1. Succession and species turnover in abandoned grasslands**

Ecological succession leads to shrub and tree encroachment of semi-natural grasslands after land-use abandonment. This session welcomes contributions dealing with the effect of land-use abandonment in any type of grasslands, including studies reporting data from permanent plots, monitoring of species and habitats, remote sensing, etc.

**2. Biodiversity of urban grasslands**

Across the Palaearctic urban grasslands are becoming a last refuge for endangered flora, fauna, and grassland habitats, especially when the surrounding rural landscapes experience either forest encroachment after abandonment, or management intensification, either through fertilization, afforestation or conversion to crops. Natural grasslands are declining in extent and quality due to overgrazing, but they are also converted to crops as irrigation becomes available. Therefore, throughout the Palaearctic, urban grassland patches may become conservation hotspots, and contribute value to urban communities. This session encourages studies focused on factors associated with diversity in urban grasslands, their contribution to the quality of urban life, and management for their persistence.

**3. Above and belowground grassland diversity**

In the Palaearctic Realm a major part of the biodiversity within most trophic levels and taxonomic groups is found in grasslands. This session will host studies dealing with alpha and beta diversity, at the taxonomic, phylogenetic or functional levels, including those reporting work on plants, animals, fungi and bacteria. Studies relating diversity patterns to variation in land use are especially welcome.

**4. Grassland conservation and global change**

This session will be focused on historical changes and future prospects on grassland extent and quality in the context of land-use trends and climate change. We encourage studies that examine the *drivers* of land-use change, *economics* of

grassland conversion, *projections* of changing grassland extent and composition, and studies of the impacts of conservation and management *policies* in the real world, whether they address changing native or alien components of vegetation, or the management of habitat for grassland inhabitants.

**5. Classification of Palaearctic grasslands and other open habitats**

Studies developing and/or applying grassland typologies are welcome in this session. Specially encouraged are contributions from Asia, North Africa and European regions lacking recent/comprehensive classifications of grasslands and other non-forest vegetation. We also call for studies that link phytosociological syntaxa to broadly defined habitat or vegetation types, both those used for conservation (e.g., EUNIS typology) or those applied in mapping and ecologic studies.

***Special Issue***

EDGG supports the visibility of the research presented in the EGCs. Studies presented in the conference will be eligible for submission to our regular special features in *Tuexenia* and *Hacquetia*. A special feature in the IAVS journal *Vegetation Classification and Survey* is planned to welcome studies dealing with grassland classification as well as its application for management and nature conservation.

***Important dates***

Registration opens: **1st March**

Early Bird registration deadline – **20th April**

Travel grant application deadline – **20th April**

Late registration deadline – **1st May**

Abstract submission deadline – **1st May**

Post-conference excursion application – **1st May**

Travel grant allocation – **31st May**

Acceptance of abstracts and type of presentation – **31st May**

We encourage you to register for the conference and the optional activities. Please find detailed information from the conference homepage and Register for the conference.

IMPORTANT: The number of participants for the post conference tour is restricted to forty (40). Thus, the local organizers must apply the principle of "first come, first served". This means that the first 40 who register themselves for the post conference tour will be accepted. The rest will be included in a waiting list. After application for the post-conference-excursion, you will receive an invoice and payment details by e-mail.

## Venue

The conference will be held in Tolosa (Basque Country, Spain, almost 20,000 inhabitants), a historic town in the province of Gipuzkoa, 25 km away from the province capital, San Sebastian (Donostia in Basque), a famous touristic location, a 20-30 min. train journey away (https://en.wikipedia.org/wiki/Tolosa,_Gipuzkoa; https://turismoa.tolosa.eus/en/information/tourism-office). In medieval times, Tolosa was a very important checkpoint between the Kingdoms of Navarre and Castile, France and the Cantabrian harbours. Currently it hosts many important

**Fig. 1. View of Tolosa and the River Oria with the Navarra bridge. The white building to the left of the bridge is called Tinglado (Zerkausia), where we will have lunch on 8th and 10th September. The bus for the mid and post-conference excursions will depart from a bus stop on this side of the bridge. Photo: I. Salcedo**

**Fig. 2 (a, b). Venue of the EGC, TOPIC (Tolosa Puppets International Centre). On the left, TOPIC in the middle of Euskal Herria square (photo: http://bit.ly/2FI3fgo); on the right, the conference hall (photo: http://bit.ly/37y4hlk).**

cultural events and a traditional market every Saturday (Fig. 1).

The registration and conference sessions will be held in TOPIC, the Tolosa Puppets International Centre, in Tolosa city centre: Euskal Herria, 1 (Figs. 2 and 3).

***Accommodation***

Accommodation should be booked independently by each participant. In Tolosa, there are two hotels, three guesthouses, and several rural accommodations. Below we give details about them. Please take into account that beginning of September is High Season in the area, so prices are not cheap. As the availability of accommodation is rather limited, we recommend booking as soon as possible. There is also the possibility of hiring flats online. Prices given below include VAT. Breakfast is a continental breakfast.

*Hotels*:

Hotel Oria, 5 min. walking from the conference venue (. Prices: single room with breakfast: €77.80; double room with breakfast: €105. Free Wifi.

Hotel BideBide, adjacent to conference venue. Prices: individual €54, double €80, triple €110 (prices excluding breakfast, but with 20% discount if reservation is made via the hotel's webpage). Free Wifi.

*Guesthouses*:

Pensión Karmentxu, in the town center. Prices: €30 single room without bathroom, €50 double room without bathroom, €75 double room with bathroom. Breakfast available, but not included. Free Wifi.

Pensión Oyarbide, in town center. Prices: €35 single room, €50 double room, both with en suite bathroom. Possibility of additional bed. Free Wifi. No breakfast service, but many cafeterias in surroundings. Parking: €10.

Hostal Bentaldea, 1 km from Tolosa (Polígono Industrial 38, Anoeta). Rooms and Prices: 2 rooms with one double bed (40 €); 3 double rooms (55 €, 28 € per person), two of them with three beds, so with possibility of three persons. In this case, the room is 70 €, so 24 € per person. All rooms with bathroom. Free Wifi.

*Rural accommodations*:

Korteta Nekazalturismoa. Rural accommodation at a distance of 1.5 km from the town centre. Only suitable for people with a car, as it is quite steep to get there (160 m higher than town center). Six double rooms available, with possibility of supplementary beds, total room for 18 people. Prices change from €25 to €50 per person, depending on single/ double room and season.

Teileri in Berrobi village. New building used as rural accommodation at 5 km distance from Tolosa. Only suitable for people with car. Two apartments with parking. Each apartment with three double rooms, two complete bathrooms, kitchen, etc. Prices: Whole apartment: €155 per night, whole house (two apartments): €310 per night.

Akulebi in Villabona, Legarreta Auzoa. 4.5 km distance from Tolosa, 1.2 km from the railway station. Three double rooms with bathroom. Breakfast service available.

Urresti and Alustiza Rural houses, both in Villabona, Amasa . 7 km distance from Tolosa.

***Travelling to Tolosa***

There are two international airports in the surroundings:

*Biarritz airport*, in the French Basque Country, with direct flights to several European cities, including Munich, London, Berlin, Geneva, etc. There are direct buses from the airport to the bus station in San Sebastian (only one intermediate stop in San Sebastian city), 45 min.

PESA: only one bus per day, summer timetable not available yet (currently, bus leaves Biarritz airport at 11:35, arrival at San Sebastian bus station at 12:30 (weekends: 12:35 and 13:30). In the other direction, the bus leaves San Sebastian bus station at 10:30, arrival at Biarritz airport at 11:15.

ALSA. This company offers three buses every day, but summer timetable not yet available.

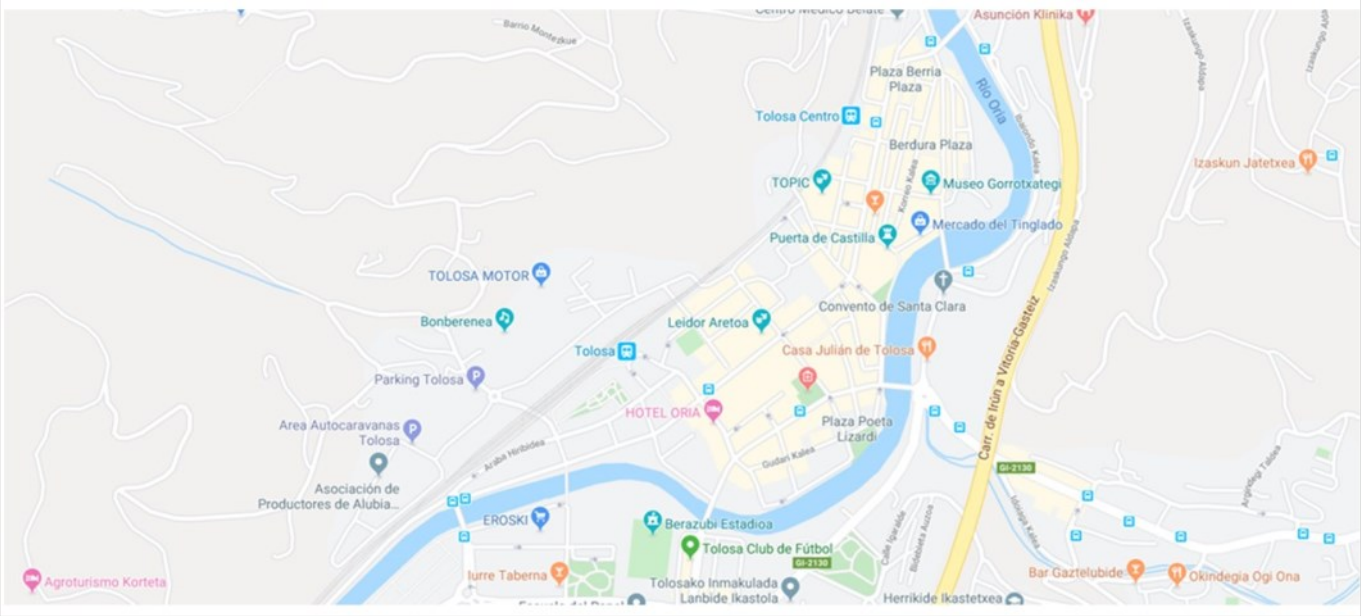


**Fig. 3. Map of Tolosa showing the two railway stations: Tolosa Centro (Tolosa Erdia officially) and Tolosa (estación, geltokia), and the conference venue TOPIC (BideBide hotel is adjacent) (GoogleMaps). Mercado del Tinglado (zerkausia), by the river, is a covered market where we will have lunch during the conference. The bridge adjacent to the Tinglado is the Navarra bridge. The bus for the excursions will leave at the south side, indicated with a cross. All distances in Tolosa are very small, from hotel Oria to TOPIC 5 to 10 minutes walking distance.**

*Bilbao airport*, near Bilbao, with direct flights to many European cities. PESA company offers direct buses from the airport to San Sebastian bus station (€17.10, 1 hour and 8 min.). Timetables not yet available, but there is high frequency of buses.

There is also a regional airport, ***San Sebastian Airport***, located at Hondarribia, on the border with France. This airport only operates with Air Nostrum, Iberia and Vueling, flying to Barcelona and Madrid. If you fly to this airport, there are two buses you can take to reach Tolosa (http://www.aena.es/en/san-sebastian-airport/public-transport.html). Bus E21 takes you directly to San Sebastian bus station, with a departure every hour. If you have to travel from San Sebastian airport to Tolosa during the weekend, you should take bus E27.

Once you reached San Sebastian bus station, you should move to the adjacent train station (bus and train stations are connected by a lift), and take a train to Tolosa (20 or 30 min.). The train has two stops in Tolosa (Tolosa centro or Tolosa erdia), in the town centre, very near the conference venue and most hotels and guesthouses, and the main station (Tolosa estación, or Tolosa geltokia), closer to Hotel Oria.

If you are travelling from Madrid, there are buses from Madrid airport and Madrid bus station to Tolosa, with ALSA company. This route stops in several cities before reaching Tolosa, so it is not so convenient. On average, the journey lasts 6 and a half hours, both for buses leaving from the airport and from the bus station.

***Visas***

If you require an official invitation letter to attend the conference, please contact the Chair of the Organizing Committee, Idoia Biurrun, after registering (Department of Plant Biology and Ecology, University of the Basque Country (UPV/EHU) P.O. Box 644, 48080 Bilbao, Spain. Email: idoia.biurrun@ehu.eus). This letter will not represent any commitment on the part of the organizers to provide financial support for you; it is only for the purpose of obtaining your visa or other such purposes.

## Keynote lectures

The 17th EGC is pleased to welcome three keynote speakers

**Diversity, management and conservation of natural and semi-natural grasslands in Spain**

**Alfonso San Miguel, Department of Natural Systems and Resources, Polytechnic University of Madrid, Madrid, Spain**

Spain is a country with an amazing diversity of natural and semi-natural grasslands. Most of them are included in old cultural landscapes and/or High Nature Value Farmland. That is why their conservation, and that of their associated biodiversity (flora, fauna, habitats of community interest), requires suitable management. In his keynote lecture, San Miguel will offer an overview of the diversity of natural and semi-natural grasslands in Spain and their associated biodiversity, and on their conservation status after the changes in their management during the last decades.

**Alfonso San Miguel** is full professor at the Department of Natural Systems and Resources, Polytechnic University of Madrid. He is a member of the Spanish Society of Pastures (President between 2010-2014) and the Spanish Society of Geobotany. He is also the Director of the National Parks Chair. His research topic is management and conservation of natural and semi-natural grasslands and rangelands and their associated biodiversity: flora and fauna. Some of his latest works deal with typology of natural and semi-natural grasslands in Spain, Types of Habitats of Community Interest and wild ungulate carrying capacity and management in Natural Protected Areas. ResearchGate profile: https://www.researchgate.net/profile/Alfonso_Miguel3.

### Species-rich semi-natural grasslands of Europe – historical masterpieces of human-nature interaction

**Monika Janišová, Institute of Botany, Slovak Academy of Sciences, Banská Bystrica, Slovakia**

Examples of positive impact of humans on ecosystem biodiversity are rare. One of the phenomenal examples are species-rich secondary grasslands of Europe, which were formed as a consequence of the low-intensity farming. Their maintenance is the main goal of current grassland conservation. Through several examples from the Carpathian Mountains, I would like to demonstrate: i) the importance of a deep knowledge of local history and traditions, which lead to the formation of each particular grassland; ii) the risks associated with substitution of traditional grassland management practices by their modern analogies; iii) the irreplaceable role of domestic animals in grassland conservation. Additionally, I would like to highlight approaches inspired by our ancestors (based on traditional ecological knowledge) that could help to keep/increase grassland diversity for our descendants.

**Monika Janišová** is a vegetation ecologist focusing mainly on grasslands, their classification, biodiversity, succession, management and conservation. She is also interested in biogeography and endemism, as well as population biology and conservation of rare plants. Recently, the main subject of her research includes traditional ecological knowledge, bio-cultural heritage and sustainable agriculture in the Carpathian Mountains (Central and Eastern Europe). ResearchGate profile: https://www.researchgate.net/profile/Monika_Janisova3.

### Patterns, dynamics and conservation of the steppes on the Mongolian Plateau

**Frank Yonghong Li, School of Ecology and Environment, Inner Mongolia University, Hohhot, China**

In his keynote, Professor Yonghong Li will summarize the patterns and dynamics of the vast and continuous eastern-most part of the Eurasian steppe, based on his field research experiences. He will discuss species diversity and vegetation dynamics in relation with climate and land-use changes, and present the status of, and the challenges for, the conservation and sustainable management of the prestigious natural grasslands.

**Frank Yonghong Li** (PhD 1992, Montpellier) is professor and dean of the School of Ecology and Environment, Inner Mongolia University, China. His research career includes many years in the Institute of Botany of Chinese Academy of Sciences (Beijing) and New Zealand AgResearch- Grasslands Research Center (Palm. North). His current research covers biodiversity conservation, ecosystem processes and multifunctioning, and restoration and adaptive management of grassland ecosystems under climate and land-use change. ResearchGate profile: https://www.researchgate.net/profile/Frank_Li10.

## Workshops

17th EGC offers two optional workshops: Meet the Editors and Introduction to *Orthoptera*.

**Meet the Editors,** facilitated by Didem Ambarlı

7th September, 17:30-18:30, with informal follow-up during the welcome drink.

We'd like to provide a platform for our participants to meet with editors of high impact journals on ecology, conservation and vegetation science and ask questions about the peer-review process and get tips on submitting a successful paper. We will have Peter B. Pearman, Jürgen Dengler, Daniel Sánchez-Mata, and Peter Török with us, who work as editors of the journals *Journal of Biogeography, Vegetation Classification and Survey, Biodiversity and Conservation* and *Ecological Restoration,* respectively. Additional Chief or Associate Editors of other journals might be in the definitive panel. This event is free of charge and all participants are cordially invited to join us before and during the welcome drink.

**Fig. 4. *Euchorthippus declivus* (left) and *Acrometopa italica* (right). Photos: R. Labadessa.**

**Rocco Labadessa** is an active EDGG member, working as freelance biologist for environmental studies and biodiversity conservation projects in southern Italy. His main research focus is plant and insect ecology and conservation, with specific studies on orthopteran ecology and biogeography, and their relationship with grassland structure and dynamics. ResearchGate profile: https://www.researchgate.net/profile/Rocco_Labadessa.

**Introduction to *Orthoptera*,** led by Rocco Labadessa

7th September, 12:00-17:30, with lunch break after indoor session

The workshop will provide key aspects on the taxonomy and ecology of grasshoppers, katydids and crickets. Through a brief course indoors and practical activities in the field, the workshop will familiarize participants with sampling and determination techniques, also give hints on the interpretation of orthopteran community and biodiversity data (Fig. 4).

This event is optional, with a fee of €20.

## Excursions

17th EGC offers a mid-conference excursion to the Aizkorri-Aratz Natural Park on 9th September and a post-conference excursion in Navarre from 11-13 September. Main excursion sites, as well as overnight towns, are indicated in Fig. 5.

***Mid-conference excursion (9 September 2020)***

We aim to show participants the biodiversity-rich grasslands of the Cantabrian valleys and mountains in the Basque Country. Two optional excursions are planned:

**Excursion 1. Mountain walk to Aizkorri peak, led by Javier Loidi.**

We will travel by bus to Otzaurte, where we will start a mountain hike to the top of Aizkorri Mountain Range, and finish in Arantzazu. It will be a long hike, with approximately 1,000 m slope.

The highest peak in the Basque Autonomous region, Aitxuri (1,551 m a.s.l.) is located in this limestone mountain range, which limits the Cantabrian and Mediterranean basins (Fig. 6). Basque legends place one of the houses of the goddess Mari, a personification of mother earth, and all the elements it contains, in these summits. In these mountains, we can find such treasures as the Tunnel of San Adrian, containing a chapel, crossed by a medieval road, and the Arrikrutz cave, with galleries full of giant stalactites.

In 2006, the Aizkorri mountain range became the Aizkorri-Aratz Natural Park, of 19,400 ha. Several forest types are abundant in these mountains, mostly beech forests, but there is also space for semi-natural grasslands in many open areas that have been retained for extensive grazing, especially in Urbia and Oltza open fields, at approximately 1,000 m a.s.l, which have been used for the summer grazing of sheep since the Neolithic, as testified by several megalithic monuments (Fig. 7). Nowadays also cattle and horses are grazing in these fields, but the indigenous latxa breed has been traditionally bred, mainly for it's milk, which is used to make Idiazabal cheese. Shepherds join in small group of txabolas (small mountain houses) during the summer months. Besides shepherding, charcoal-making has also been a traditional activity in these mountains.


**Fig. 5. Map showing the venue of the conference (Tolosa), destination of the mid-conference excursion (Aizkorri-Aratz) and main destinations of the post-conference excursion to Navarre (source: GoogleEarth). Airports are also indicated, as well as main cities in the surroundings.**

Many species of mammals, birds and amphibians inhabit these forests, pastures and cliffs: alpine newt (*Ichthyosaura alpestris*), Iberian frog (*Rana iberica*), Peregrine falcon (*Falco peregrinus*), Griffon vulture (*Gyps fulvus*), Egyptian vulture (*Neophron percnopterus*), Alpine chough (*Pyrrhocorax graculus*), Red-billed chough (*Pyrrhocorax pyrrhocorax*), European snow vole (*Chionomys nivalis*), European pine marten (*Martes martes*), European polecat (*Mustela putorius*), European wildcat (*Felis silvestris*) and several bat species.

On our way to the mountain summit, we will cross dry grasslands with *Helictotrichon cantabricum* and *Sesleria autumnalis* and basophilous thorny-cushion scrub with *Genista occidentalis*, successional stages of *Quercus pubescens* forests. We will go up to the Urbia fields, at 1,100 m a.s.l., through beech forests. In Urbia, grasslands of *Violion caninae* and heathlands of *Daboecion cantabricae* form the

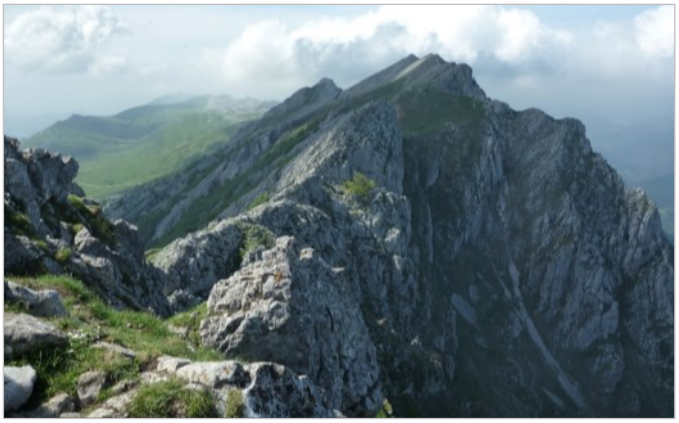

**Fig. 6. Aizkorri summit. Photo: J. Loidi.**

**Fig. 7. Urbia fields (photo: http://bit.ly/31ovWls).**

**Fig. 8. Surroundings of Orendain, Aralar. Left: Larreta farm (photo: https://www.larretaesnekiak.com/); right: sheep herd with Txindoki mountain on the back (photo: http://bit.ly/39qD9Ws).**

traditional pastoral landscape. Back on the limestone steep slopes towards the summit, rocky grasslands of the class *Festuco-Ononidetea* occur, with *Teucrium pyrenaicum, Carex caryophyllea, C. ornithopoda, Festuca rectifolia, Brachypodium rupestre, Clinopodium alpinum, Thymus praecox*, etc. At higher elevations, we will find subalpine dry grasslands with *Festuca gautieri* subsp. *scoparia* and *Agrostis schleicheri (Festucion scopariae).* Near the summit, limestone cliffs harbour rupicolous communities, with *Potentilla alchimilloides, Hornungia alpina* subsp. *auerswaldii, Dethawia splendens* and *Erinus alpinus (Sedo-Seslerion hispanicae*), as well as mesic chionophilous grasslands with *Sesleria caerulea (Primulion intricatae).*

**Excursion 2. Visit two farms, meadows and pastures in Aralar and Aizkorri mountain ranges, led by Idoia Biurrun.**

Our first stop will be a short walk to enjoy morning fresh air in the northern foothills of the Aralar mountain range (Aralar Natural Park), near the villages of Abaltzisketa and Larraitz, under the impressive silhouette of Mount Txindoki. After this nice walk, we will visit the Larreta farm in the village of Orendain, at 5 min. distance by bus (Fig. 8).

We will then move to Ataun, in the western foothills of the Aralar range, where we will learn about an old method of bringing the hay to the valley from the steep slopes in the hills, and also have a nice walk by the stream and surrounding meadows (Fig. 9). In Ataun, we might visit another farm, but this is not fixed yet.

After our picnic in Ataun, we will travel to Arantzazu (45 min.), already in the Aizkorri-Aratz Natural Park. In Arantzazu, we will first hike for 2-3 hours to mountain grasslands above the village, and afterwards visit the Gomiztegi farm and shepherd school. They will show us their facilities, how they make the Idiazabal cheese with the milk of the Latxa sheep, and perform a demonstration with Basque shepherd dogs working with sheep herds (Fig. 10).

**Fig. 9. Dome in Ataun (photo: http://bit.ly/2UK4K0P).**

Both excursions with join at 19:00 for the Grassland Party nearby the Arantzazu sanctuary.

***Post-conference excursion (11-13 September 2020)***

(optional - maximum number of participants: 40)

The three-day post-conference excursion will take place mostly in Navarre, a highly diverse region where three biogeographic regions meet: Atlantic, Alpine and Mediterranean. Fig. 11 shows the main natural vegetation types in Navarre. The Atlantic region covers the north and centre of the region and it is divided into two main areas: Cantabrian valleys, with oceanic and rainy temperate climate, and submediterranean valleys, where the climate is still temperate, but a bit dryer and more continental. Natural vegetation in this region is formed by oak forests (mostly *Quercus robur,* but also *Q. pubescens* in submediterranean areas) in valleys and hills, and beech forests in the mountains. Grasslands are semi-natural grasslands, except for azonal grasslands in the coastal ecosystems and rocky areas. Meadows are


**Fig. 10. Gomiztegi farm and shepherd school (photo: http://www.oñatiturismo.eus/es/listings/gomiztegi-baserria/).**

mostly found in valleys, while in the mountains, acidophilous grasslands of *Violion caninae (Nardetea strictae)* and basophilous dry grasslands of *Potentillo-Brachypodion pinnati (Festuco-Brometea)* and *Bromo-Teucrion pyrenaici (Festuco-Ononidetea)*, the latter in rocky slopes, prevail. Heathlands are one of the most typical landscape features, especially on siliceous bedrocks and leached soils.

The Alpine region, in the northeast corner, is the Pyrenees, one of the most beautiful and impressive European mountain ranges. The Pyrenees form the border between Spain and France from the Mediterranean to the Atlantic, and in Navarre, they are represented by the Western Pyrenees, the most oceanic part of the range. Natural vegetation comprises downy oak (*Quercus pubescens*) and silver fir-beech forests in the montane belt, *Pinus uncinata* forests in the subalpine belt and alpine grasslands over the timberline, belonging mostly to the alliances *Primulion intricatae, Festucion scopariae* and *Carici macrostylidi-Nardion strictae*.

The Ebro River valley occupies the south of the region, with a typically Mediterranean climate, though we can still find differences from the upper part to the centre of the valley (the so-called Ebro depression). On the upper part, the climate is still quite rainy, and natural vegetation corresponds to deciduous forests dominated by *Quercus faginea*, whereas evergreen *Quercus rotundifolia* becomes dominant on the rocky slopes. Secondary grasslands still belong to *Festuco-Brometea,* at least in the deepest soils, although a particular meso-xeric grassland where *Brachypodium phoenicoides* is dominant. Down the valley, the climate becomes drier and warmer, and the natural vegetation is formed only by evergreen sclerophyllous trees (*Quercus rotundifolia*). Secondary shrublands and grasslands are typically Mediterranean: garrigues, with *Rosmarinus officinalis* (*Ononido-Rosmarinetea*) and Mediterranean grasslands, where *Brachypodium retusum* is the dominant species (*Lygeo-Stipetea: Phlomido lychnitis-Brachypodion retusi*).

The driest area in Navarre is located in the southernmost corner, near the Ebro River. Here, the bioclimate is Mediterranean xeric, too dry even for the sclerophyllous forest, and thus the natural vegetation is an open woodland with *Pinus halepensis* and *Juniperus thurifera*, which is better represented towards the center of the Ebro depression, in the Zaragoza province. An exceptional grassland type can be found here on the clayey soils: the relict Mediterranean steppes, formed by *Lygeum spartum*, with *Stipa capillata* and *S. lagascae (Agropyro-Lygeion sparti)*. *Lygeum spartum* also forms grasslands on the edges of inland saltpans (*Limonion catalaunico-viciosoi*), in contact with halophilous scrub (*Suaedion brevifoliae*) and grasslands (*Puccinellion lagascanae*). Another outstanding feature of this semi-arid area is the abundance of nitrophilous steppic scrub of the class *Pegano-Salsoletea*. Mediterranean grasslands and scrubs are used as winter pasture by big sheep folks that move to the Pyrenean grasslands in summer (Fig. 12).

On the first day, we will leave Tolosa at 8:00 in the morning from the same bus stop as the mid-conference excursions (near Navarra bridge, see map). We will travel directly to Jaizkibel, a small coastal mountain between San Sebastian and Hondarribia, a beautiful town on the border with France. Sandstone is the prevailing rock in this mountain, and thus heathlands cover almost all the surface, maintained by repeated burning and extensive grazing. These coastal heathlands are very thermophilic, as frost is very rare near the ocean, and therefore the floristic composition is quite different to that of the mountain heaths. Small patches of mires are scattered in the heathland, with interesting communities belonging to *Anagallido-Juncion* and *Hyperico elodis-Sparganion.* After a walk in the heathland, we will have coffee and refreshments near Guadalupe chapel, with an impressive panorama of the estuary of the Bidasoa River, the natural border between Spain and France, with the towns of Hondarribia (Spanish Basque Country) and Hendaye (French Basque Country) (Fig. 13).

We will continue our journey by bus up the Bidasoa River, and will enter Navarre a few kilometers from the sea. We will climb to the Belate mountain pass, in the interfluve of the Atlantic and Ebro basins. The trip will take us one hour

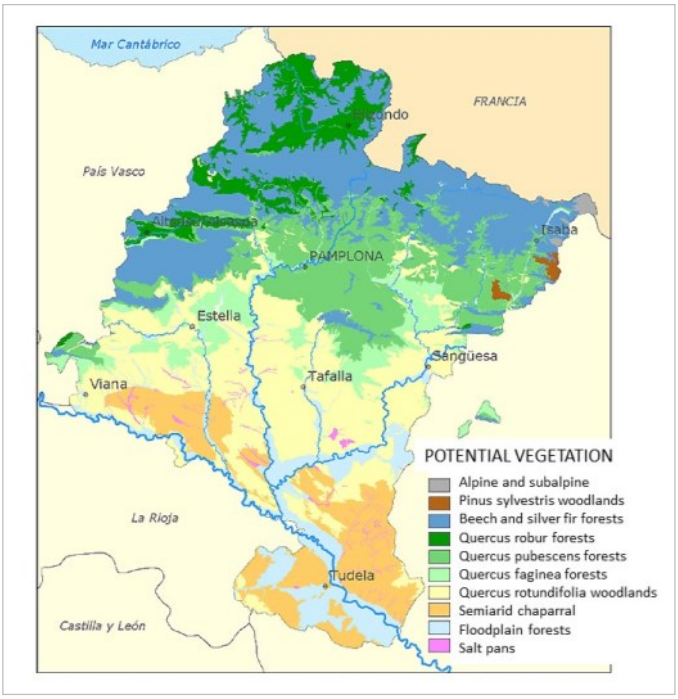


**Fig. 11. Map of potential vegetation of Navarre. Modified from the** http://www.cfnavarra.es/agricultura/informacion_agraria/MapaCultivos/seriesvegetacion.html**.**

or less. In Belate, we will stop to visit mountain acidophilous grasslands and heathlands, but we will especially focus on the Belate mire. This is one of the largest mires in the Basque mountains, although it has long suffered drainage, eutrophication and overgrazing. During recent years, a restoration project has been initiated, and we will be able to see some of the permanent plots used for monitoring. Asun Berastegi and Javier Peralta, our guides on this excursion, are responsible of this monitoring study, so we will have all the information, and we will be able to ask about the progress.

In the afternoon, we will continue our journey by bus southwards, and our next stop will be in the Urbasa mountain range. There, we will enjoy the mountain landscape, with basophilous beech forests and extensive grasslands. The location of this mountain, south of the Atlantic-Mediterranean divide, creates a high diversity of vegetation, with temperate grasslands of *Festuco-Brometea* and *Nardetea* co-occurring with submediterranean grasslands of *Festuco-Ononidetea*, with *Festuca hystrix, Helianthemum incanum, Jurinea humilis*, etc. From Urbasa we will go down to the Mediterranean region, and travel to our accommodation in the historical town of Olite (Hotel La Joyosa Guarda) (Fig. 14). We are already in Ebro valley, although still on the margins of its tributary Cidacos. For those of you who never visited the Mediterranean Region, we will make a special toast during the dinner!!

On the second day, we will travel directly southwards to the Ebro depression, towards the driest area in Navarre, Bardenas Reales. En route, we will stop near the River Aragón in Mélida, a tributary of the River Ebro, coming from the Western Pyrenees, to enjoy panorama and visit some halophilic and gypsophilic communities in Caparroso. The main stop of the journey will be in the impressive Bardenas Reales, and huge non-urbanized extension of badlands, plateaus, saltpans and canyons, in which the soils comprise clay, chalk and sandstone (Fig. 15).

After a long stop in Bardenas, picnic included, we will return our journey and travel northwards to the Pyrenees. We will make a last short stop in the Mediterranean Region, near the village of Lumbier (Iso mountain pass) and a photo stop at the panorama of the impressive canyon Foz de Arbayun. In the evening, we will reach our accommodation in the village of Isaba. We will sleep at the Isaba hotel, but before going to bed we will have the opportunity to walk around the village, which is full of life during summer weekends.

On the third day, we will go by bus to the mountain pass called Piedra de San Martin, on the border with France. From there we will hike through subalpine and alpine grasslands and dwarf shrublands with *Juniperus alpina* and *Rhododendron ferrugineum* (Figs. 16 and 17). The most abundant grasslands are acidophilous *Nardus stricta* grasslands (*Campanulo-Nardion*) on deep soils, communities of *Festucion scopariae* on the sunny and rocky slopes (Figs. 18 and 19), and of *Primulion intricatae* where snow accumulates.

**Fig. 12. Sheep heards are taken from the winter pastures in Bardenas Reales to the summer pastures in the Pyrenees along traditional paths (Cañadas Reales), nowadays most of them under roads. Sheeps arriving to Pyrenean valleys (left), climbing to the mountain (center), enjoying the subalpine grasslands. Photos: A. Berastegi.**

**Fig. 13. Estuary of Bidasoa River, frontier between Spain (below) and France (above). Photo: I. Salcedo.**

In the afternoon, we will return to the bus and go down the mountain pass northwards, entering France. We will enjoy the nice traditional landscape of French Basque Country from the bus, with small white villages, meadows, heathlands and small patches of natural forests. We will stop in one of these villages for some refreshment and, if we have some time, visit some meadows and heathlands. In the evening we will reach our accommodation near Biarritz airport, the hotel IBIS Biarritz Anglet Aeroport, at 1.5 km distance from the airport. Our three-day journey will finish here. Next day participants with flights in the afternoon will have the possibility to visit the touristic town of Biarritz, at 3 -4 km from the hotel.

***Practical advices for the participants about the excursions***

Excursions will take place at the end of the summer, so the weather may be either warm and sunny, or rainy and a bit chilly, especially in the mountains. Therefore, participants should bring rainwear for the excursions.

## Grassland Party

The Grassland Party will take place on 9th September, near the Arantzazu sanctuary, where the participants of the two mid-conference excursions will join at around 19:00. The Sanctuary, located over a steep ravine at 750 m a.s.l., is the main entrance to Aizkorri-Aratz Natural Park, is famous for its great artistic and architectonic value (Fig. 20).

During the Grassland Party we will taste local food (cheese, vegetables, meet, etc.) and drink (cider, wine), and we will have the opportunity to see and listen to Basque traditional dances and music, including an exhibition of txalaparta, a traditional percussion instrument where two txalapartaris (txalaparta musicians) play music using two wooden sticks each over a board (Fig. 21).

**Fig. 14. Palace of the kings of Navarre of Olite. Photo: A. Berastegi.**

**Fig. 15. Castil de Tierra, Bardenas Reales, with *Lygeum spartum* on the front. Photo: J. Loidi.**

## Auction

The auction will take place during the Grassland Party in Arantzazu.

Conference participants are encouraged to bring foods and drinks from their countries. Any other object related to grasslands, their management and biodiversity are also welcome, e.g., books, traditional tools and music instruments, plants and animal drawings, etc. All items brought for the auction will be delivered upon registration, so that they can be exhibited during the first conference day. The organizers will be responsible for taking all the objects for the auction to the Grassland Party.

## Fees

The registration fee provides full participation in the conference, including registration and conference materials, admission to the conference, lunches and coffee breaks on 8th and 10th September, mid-conference excursion with lunch pack, grassland party, and Meet the Editors workshop. A childcare service will be offered upon demand and free of charge. Please indicate during registration if you will need it.

***Fees of the optional events***

The basic registration fee does **NOT include** the following, which can be booked separately:

- Post-conference excursion (11-13 September): €275
- Workshop on *Orthoptera* (7 September): €20

***Payments***

Payments should be made by bank transfer by 20th April at the latest for early bird registration and by 1st May for late registration. Below are the bank details. We are not able to accept payment of the registration fee at the conference: this must be paid in advance by bank transfer.

| | **Early Bird Registration Until 20th April** | **Late Registration until 1st May** |
|---|---|---|
| Student IAVS members* | **€150** | **€180** |
| Students, not IAVS members* | **€170** | **€200** |
| Other IAVS members* | **€200** | **€230** |
| Non-students and non-IAVS members | **€220** | **€250** |

**Please submit evidence of IAVS membership and/or your enrolment at a University by emailing confirmation of matriculation to* idoia.biurrun@ehu.eus

**Bank:** Kutxabank

**IBAN:** ES35 2095 0292 9191 1945 3561

**SWIFT (BIC):** BASKES2BXXX

**Account holder:** Universidad del País Vasco-Euskal Herriko Unibertsitatea

**Payment reference:** EGC 2020, participant's name and surname (Please indicate this information in the details of your payment!)

Please note that, the post-conference excursion fee should be paid after you receive a confirmation email about your place.

**Fig. 16. Larra karstic area in the Western Pyrenees. Photo: A. Berastegi.**

**Fig. 17. Pic d'Anie, 2,507 m a.s.l., in the border between France, Navarre and Aragón. Photo: A. Berastegi.**

***Cancellation and refund***

Cancellation and repayment for symposium:

100% cancellation until 31st June

80% cancellation until 31st July

No refund for cancellation after 31st July

Cancellation and repayment for post-conference excursion:

No refund for cancellation after 30th May

***Financial support***

Thanks to the EDGG's mother organization IAVS, we can support a number of participants with travel grants. Travel grants will be awarded according to the IAVS criteria, based on income level and country of origin. They will preferentially be given to early-career and other financially constrained scientists. The support usually covers only part of the participant's costs, according to the number of successful applications. To qualify for a travel grant, active participation at the conference (oral presentation or poster) is required. Only the presenter of the contribution will be supported so each applicant should apply with a separate talk or poster and she/he will be the presenter. After the conference, grantees must provide a short report of the event, and some photos that can be used in *Palaearctic Grasslands*.

Travel grants can be applied for during registration until 20th April, including a short motivation letter. Applicants for IAVS travel grants must be IAVS members for the year 2020. Information about travel grants will be given at the latest by 31st May.

## Young Investigator Prizes

As in previous years, prizes will be awarded to young scientists for excellent presentation of their research (orally or in poster form). For these purposes, young scientists (less than 30 years old) will be asked during registration if they wish to participate in the contest. An applicant can apply for one category (best talk or poster) in one conference. During her/his presentation, applicant needs to explain clearly her/his contribution to the work.

## Registration

***For registration, please follow these steps:***

- Register a new account or log into the website if you already have an account: EDGG homepage login. You cannot proceed to the next steps if you do not log in.
- Make sure your user account contains up-to-date contact data and details relevant for the conference organizers (e.g. special diet).
- Register for the conference in the separate webform: EGC2020 Registration
- Check your preliminary conference invoice and pay the conference fees.
- Upload abstracts for your conference contributions.

You will find the same links on the menu to the right.

**Hope to meet you in EGC2020!**

## Organizers

The conference is organized by the EDGG and the University of the Basque Country. It is supported by the Basque Governement, the Government of Gipuzkoa, the City Council of Tolosa, the University of the Basque Country and Hazi, public agency for rural, coastal and food development.

**The Eurasian Dry Grassland Group (EDGG)** was established in August 2008 as the European Dry Grassland Group. Recently it expanded its ecological and geographical scope to cover all types of semi-natural grasslands of the whole Palearctic realm. The EDGG is an official group of the International Association for Vegetation Science (IAVS,

**Fig. 18. *Festuca gautieri* in scree. Photo: A. Berastegi.**

**Fig. 19. *Festuca altopyrenaica* on rocky slope. Photo: A. Berastegi.**

**Fig. 20.** Arantzazu Sanctuary.

**Fig. 21.** Txalapartaris.

www.iavs.org). Its basic aims are to compile and to distribute information on research and conservation of natural and semi-natural grasslands beyond national borders, and to stimulate active cooperation among scientists, practitioners and all who work with or are interested in grasslands.

**The University of the Basque Country (UPV/EHU).** In a prosperous region stretching along the Atlantic coast of northern Spain, the people of the Basque Country are the custodians of one of Europe's most ancient languages and cultures. Yet, they not only have a high esteem for tradition, but are also remarkably forward-looking and have established a highly regarded industrial sector. The region's success and scientific and technological progress are underpinned by the University of the Basque Country, a vibrant 30-year-old institution with 45,000 students, 5,000 world-class academic staff and state-of-the-art facilities. Our logo, symbolizing the tree of science, was created by the Basque artist Chillida, motivated by a strong popular movement in the 70s towards the creation of the Basque university. Following our motto 'Give and spread knowledge', the University of the Basque Country is an integrating institution willing to produce knowledge, experience and research, in order to forward them to the general public.

***Local Organizing Committee***

Idoia Biurrun, University of the Basque Country
Itziar García-Mijangos, University of the Basque Country
Javier Loidi, University of the Basque Country
Juan Antonio Campos, University of the Basque Country
Isabel Salcedo, University of the Basque Country
Peter B. Pearman, University of the Basque Country
Asun Berastegi, Gestión Ambiental de Navarra, guide on the Post-conference excursion

***Scientific Committee***

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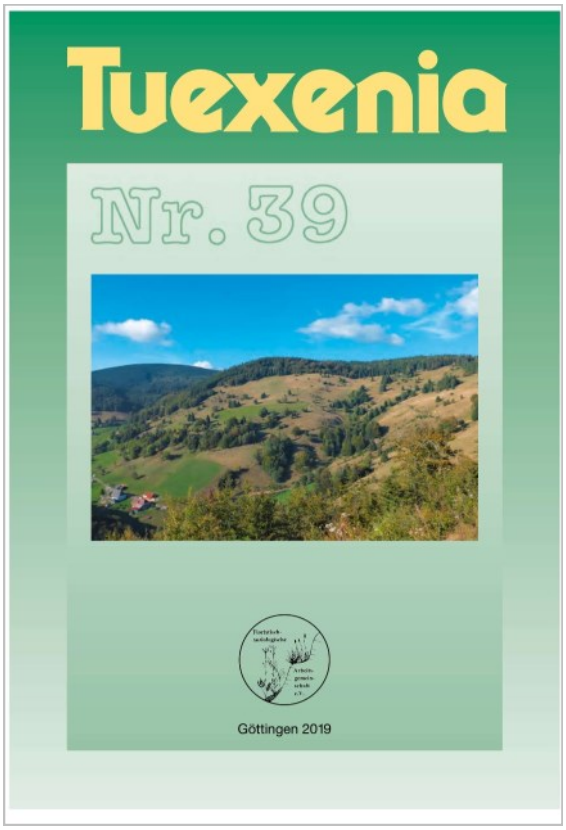
Basque Government
International Association of Vegetation Science
University of the Basque Country
Town Council of Tolosa
Gipuzkoa Provincial Council
Hazi

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

## *EDGG Publication*

# 'Restoration, monitoring, conservation and phytosociology of semi-natural and natural grasslands in Central Europe': the 14th EDGG Special Feature in *Tuexenia* has been published




The 14th EDGG Special Feature in *Tuexenia* follows a long tradition of publishing studies conducted in semi-natural and natural grasslands of Central Europe. The present Special Feature edited by Balázs Deák, Thomas Becker, Steffen Boch, Jürgen Dengler and Viktoria Wagner (Deák et al. 2019) focuses on the restoration, monitoring, conservation and phytosociology of Central European grasslands. Altogether 40 authors from seven countries (Austria, Czech Republic, Germany, Hungary, Italy, Romania and Switzerland) were involved in the six published articles. The Special Feature highlights many aspects of grasslands involving different study organisms and scales. Boch et al. (2019) investigated the feasibility of quasi permanent plots in the long-term monitoring of mean indicator values, species composition and turnover in dry grasslands of Switzerland. Chytrý et al. (2019) describe dry grassland vegetation in the Transcarpathian Lowland and reported three new associations for Ukraine. Erdős et al. (2019) revealed the trends in the species composition and richness along a centre-to-periphery gradient in forest-steppes of the southern Carpathian Basin. Gheza et al. (2019) provide detailed descriptions on the syntaxonomy, ecology and conservation value of the terricolous lichen communities in pioneer acidic *Thero-Airion* dry grasslands of the Po Plain, Northern Italy. Mardari et al. (2019) studied the population structure and habitat characteristics of *Arnica montana* in the Carpathians. Roleček et al. (2019) report new maxima of fine-scale vascular plant species richness from Romanian and Ukrainian semi-dry grasslands.

The publications are all open access and freely available from the journal website at https://www.zobodat.at/publikation_volumes.php?id=62149. Soon they will also be provided on the EDGG website.

***Balázs Deák,*** *Vácrátót, Hungary*
debalazs@gmail.com

**Contributions in the Special Feature**

Boch, S., Bedolla, A., Ecker, K.T., Graf, U., Küchler, H., Küchler, M., Holderegger, R. & Bergamini A. 2019. Mean indicator values suggest decreasing habitat quality in Swiss dry grasslands and are robust to relocation error. *Tuexenia* 39: 315–334.

Chytrý, K., Novák, P., Kalníková, V., Večeřa, M., Prokešová, H., Dřevojan, P. & Chytrý, M. 2019. Dry grassland vegetation in the Transcarpathian Lowland (western Ukraine). *Tuexenia* 39: 335–355.

Deák, B., Becker, T., Boch, S., Dengler, J. & Wagner, V. 2019. Restoration, monitoring, conservation and phytosociology of semi-natural and natural grasslands in Central Europe – Editorial to the 14th EDGG Special Feature. *Tuexenia* 39: 309–313.

Erdős, L., Bátori, Z., Bede-Fazekas, Á, Biró, M., Darányi, N., Magnes, M., Pásztor, L., Sengl, P., Szitár, K., (…) & Kröel-Dulay, G. 2019. Trends in species composition and richness along a centre-to-periphery gradient in forest-steppes of the southern Carpathian Basin. *Tuexenia* 39: 357–375.

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## *EDGG Publication*

# Call for contributions to the new EDGG-edited Special Feature in *Hacquetia*: Fauna, flora, vegetation and conservation of Palaearctic natural and semi-natural grasslands

This is the second 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* (http://www.degruyter.com/view/j/hacq) is an international journal of the Biological Branch of the Slovenian Academy of Sciences. It is published in two issues per year, both in print and online. With longer articles on offer, open access and free reproduction of colour figures, it is a very attractive publication venue. 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).

This Special Issue will be the 6th EDGG-edited Special Issue in *Hacquetia*, following the five successful issues in 2014/1, 2015/1, 2016/2, 2018/1 and 2019/2. This Special Issue will appear as the first issue of 2021, to be published approximately in January 2021, with about 150–250 pages reserved for our articles. It will also contain a report on the EDGG activities in the previous year.

Procedure and deadlines: The **deadline for full-text submission is 15 March 2020** and manuscripts will undergo the normal peer-review process. Manuscripts submitted before the deadline have a higher chance for inclusion in the 2021/1 issue, but well prepared papers submitted after the deadline might also have a chance for being included. Submissions that require extensive revision will be available online when ready (ahead of print).

If you are interested in contributing a manuscript to this comprehensive Special Issue, then please contact the Chair of the editorial team (see below) and submit your manuscript to her. Author guidelines can be found at the journal homepage: http://www.degruyter.com/view/j/hacq.

**Guest Editor Team**

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Contact for questions and submission of manuscripts (Chair of the Guest Editors):

***Orsolya Valkó,*** *Vácrátót, Hungary*
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## *Announcement*

# Start of *Vegetation Classification and Survey*, the new IAVS journal

Our mother organisation, the International Association for Vegetation Science (IAVS), recently has launched its third journal, *Vegetation Classification and Survey* (VCS), to complement *Journal of Vegetation Science* (JVS) and *Applied Vegetation Science* (AVS). VCS is a gold open access journal, owned by IAVS and published by the innovative Bulgarian publishing house Pensoft, which is specialised in open access publishing in the fields of organismic biology, ecology and conservation, often in collaboration with academic societies. The journal website with further information is at https://vcs.pensoft.net/ (Fig. 1).

VCS is devoted to development of **phytosociological (and other) classification systems** and their application in fundamental and applied research as well as in nature conservation. It welcomes also longer, monographic articles as well as regional studies. There are permanent collections on **Ecoinformatics** (including Long and Short Database Reports in collaboration with GIVD) and **Phytosociological Nomenclature**. Thanks to a strong support from IAVS, we can offer attractive article processing charges (APCs), which are much lower than in comparable journals (see Table 1). If submitted in 2020, a standard article of 11-20 printed pages will only cost 600 EUR, but there are substantial discounts for IAVS members and people from medium- and low-income countries or with personal financial constraints. Also shorter articles will be much cheaper.

### Advantages of publishing in VCS

Publishing in VCS comes with the following major advantages:

- The leading journal in vegetation classification and survey
- The only journal that regularly publishes Long and Short Database Reports of vegetation-plot databases in collaboration with the Global Index of Vegetation-Plot Databases (GIVD)

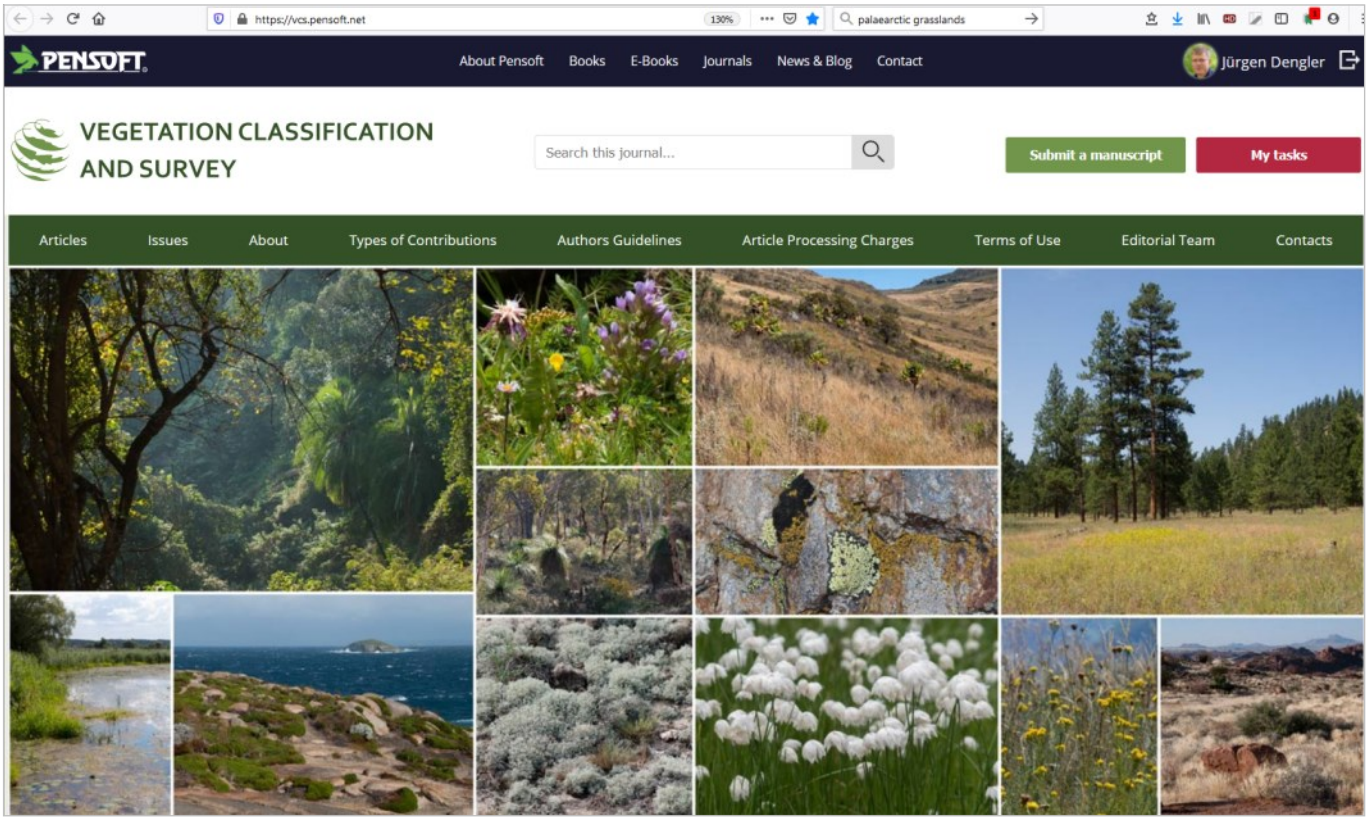


**Fig. 1. Homepage of the VCS website.**

**Table 1. Article processing charges (APCs) in VCS for articles submitted in 2020.**

| **Base fee 2020:** | | | Author group[5] | | | | |
|---|---|---|---|---|---|---|---|
| **600 €** | | | **Regular** | **IAVS Member** | **Chief or Associate Editor** | **Financial Hardship[1]** | **Extreme Financial Hardship[2]** |
| | | | **(i.e. no discount)** | **EdBoard member** | **Linguistic Editor** | **Country group 2[3]** | **Country group 3[4]** |
| | | **Discount** | | **-10%** | **-20%** | **-40%** | **-80%** |
| | | **Factor** | | **90%** | **80%** | **60%** | **20%** |
| **Article length (print pages)** | **1-2** | **25%** | 150 € | 135 € | 120 € | 90 € | 30 € |
| | **3-6** | **50%** | 300 € | 270 € | 240 € | 180 € | 60 € |
| | **7-10** | **75%** | 450 € | 405 € | 360 € | 270 € | 90 € |
| | **11-20** | **100%** | 600 € | 540 € | 480 € | 360 € | 120 € |
| | **21-40** | **125%** | 750 € | 675 € | 600 € | 450 € | 150 € |
| | **>40** | **150%** | 900 € | 810 € | 720 € | 540 € | 180 € |

[1] Defined as an annual income of less than 50% of the per capita income for the group 1 country of residence
[2] Author would need to contact the editor and provide evidence of extreme financial hardship
[3] Countries with a per capita income between US$10,000 and US$24,999 (based on our country list)
[4] Countries with a per capita income less than US$10,000 (based on our country list)
[5] For authors belonging to different categories, the highest discount applies, while discounts are not cumulative

- Competent and dedicated team of editors and reviewers
- Global visibility and availability of articles through open access
- Longer articles (> 20 pages) are possible for comprehensive classification works
- Colour illustrations are encouraged at no cost, particularly to visualise the analysed vegetation types
- Issues and articles are advertised via various media of the journal and IAVS
- Close collaboration with IAVS and its working groups; any eventual profit will go to IAVS and be used to support vegetation ecological research

**Conclusions**

We look forward to your submissions. We also plan an EDGG-edited Special Feature (called Special Collection in VCS) on grassland classification in conjunction with the Eurasian Grassland Conference (EGC) in Tolosa.

***Jürgen Dengler & Idoia Biurrun***
***(on behalf of the VCS Chief Editors)***

DOI: 10.21570/EDGG.PG.45.25-33 *Research Article*

# Spontaneous grassland vegetation of the garden and park landscapes of Middle Pobuzhzhia (Central Ukraine)

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**Abstract:** The spontaneous grassland vegetation of the garden and park landscapes of Middle Pobuzhzhia (Central Ukraine) has been studied for the first time. An inventory of its syntaxonomical diversity has been carried out. The material for the study was 70 relevés (which included 258 species) of grassland vegetation sampled between 2007 and 2017 in 15 parks and gardens (one dendrological park, one botanical garden and 13 monuments of landscape gardening). The relevés were stored in a TURBOVEG database. The data analysis was performed in the JUICE program using a modified TWINSPAN algorithm. Diagnostic species were determined using fidelity measure of phi-coefficient. The resulting classification scheme includes four classes, four orders, four alliances, five associations and one community. Phytoindicative evaluation was carried out on environmental factors: soil humidity, acidity, total salt regime, carbonate content in soil, nitrogen content, aeration of soil, light. The ordination of the resulting clusters revealed the leading role of soil humidity and fertility in their differentiation. The clusters were divided into two groups: mesic (Community of *Lamium maculatum* and *Ficaria verna*; *Lolietum perennis* Gams 1927; *Sagino procumbentis-Bryetum argentei* Diemont et al. 1940) and dry (*Trifolio medii-Agrimonietum* Müller 1962; *Salvio pratensis-Poetum angustifoliae* Korotchenko & Didukh 1997; *Medicago romanicae-Poetum angustifoliae* Tkachenko et al. 1987). The study confirms that spontaneous grassland vegetation of garden and park landscapes is a sensitive indicator of the state of their disturbance and can be used for monitoring purposes.

**Keywords:** garden; grassland; habitat; Middle Pobuzhzhia; park; Southern Bug River basin; steppe; Ukraine; vegetation.

**Nomenclature:** Cherepanov (1995) for vascular plants; Mucina et al. (2016) for syntaxa.

**Abbreviations:** Ae = aeration of soil; Ca = carbonate content in soil; DCA= Detrended Correspondence Analysis; Hd = soil humidity; Lc = light; NAS= National Academy of Science; Nt = nitrogen content; Rc = acidity; Sl = total salt regime.

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Scientific Editor: Arkadiusz Nowak

Linguistic Editor: Stuart Smith

## Introduction

Garden and park landscapes are anthropogenic, and combine natural components (rocks and their surface forms, water, soils, vegetation, etc.) with small architectural forms and structures and road infrastructure. They form an interconnected unity in which features of social perception of the world are reflected through the prism of social, economic and political development (Denisik & Kravtsova 2012).

Park and garden landscapes have been the subjects of various scientific works, but as objects of vegetation science they are insufficiently studied. The garden and park landscapes of Middle Pobuzhzhia are determined by their location in the basin of the Southern Bug River, with a rich floristic composition and a variety of natural complexes.

The spontaneous vegetation cover of botanical gardens and arboretums is characterized by a high degree of species-richness and diversity, as it is composed of several groups of plants: 1) native species related to the prevailing vegetation types, especially the zonal ones; 2) weed species, diaspores of which are introduced with planting material of ornamental plants; 3) ruderal species, the diaspores of which are introduced by visitors, 4) ergasiophytes ("escapees from cultivation"), and 5) native species planted in the park coenoses with an *ex-situ* conservation purpose, and which have


**Fig. 1. Location of the garden and park landscapes of Middle Pobuzhzhia (Modified from Gavrykov & Marushevskyi 2009).**

formed stable populations capable of independent recovery and spontaneous spread (Kuzemko et al. 2011).

Grassland communities (meadows, clearings, lawns), as a part of spontaneous vegetation, are a lifeline for many plants and animals. They can be used to assess environmental quality in urban ecosystems using biological monitoring methods. Therefore, the study of the spontaneous vegetation of parks is an important scientific and conservation issue. The aim of the work is to provide an inventory of syntaxonomical diversity of spontaneous grassland vegetation of garden and park landscapes in Middle Pobuzhzhia and to reveal their syntaxonomic diversity and peculiarities.

## Study area

Middle Pobuzhzhia is a historical and geographical region. It includes the central part of the Southern Bug River basin (Central Ukraine) (Fig. 1). The source of the river is in the Podillian Uplands and it flows via the Bug estuary into the Black Sea. The area of its basin is 63,700 km$^2$. In general, the climate of the Southern Bug River basin is moderately continental with mild winters and rather warm humid summers. The mean annual temperature is 7.1–8.1 °C. Annual rainfall is 550–669 mm, gradually decreasing from the north to south. From a geological point of view, Middle Pobuzhzhia is located within the Ukrainian Crystalline Shield, which is one of the largest elevated sites of the crystalline foundation of the Eastern European Platform. The light and dark gray podzolized as well as black soils prevail in the region (Denisik 2002; Vorona et al. 2009).

According to the geobotanical zoning of Ukraine, Middle Pobuzhzhia is situated within the Eurasian Steppe region, which belongs to the Holarctic. It includes the Forest-Steppe subregion, Eastern European Forest-Steppe province, Ukrainian Forest-Steppe subprovince (Didukh & Shelyag-Sosonko 2003).

Garden and park landscapes of Middle Pobuzhzhia include botanical gardens, dendrological parks and monuments of landscape gardening in Vinnytsia and Cherkasy regions of Ukraine. They have more than 200 years of history, rich floristic composition and various natural complexes, of great scientific and artistic interest (Table 1).

## Methods

The material for the study was 70 relevés (which included 258 species in total) of grassland vegetation sampled between 2007 and 2017 in parks and gardens of Middle Pobuzhzhia (botanical gardens, dendrological parks and monuments of landscape gardening) in the Vinnytsia and Cherkasy regions of Ukraine: 15 localities in total (Fig. 1, Table 1). The sampled plots were recorded within homogeneous vegetation cover, with total cover of trees and shrubs

**Table 1. Main characteristics of the studied gardens and parks.**

| № | Name | Legal status | Location | Time of establishment | Year of implementation of legal protection | Area [hectares] | Terms of research |
|---|---|---|---|---|---|---|---|
| **1** | Central City Park in Vinnytsia (Central Park of Culture and Recreation named after M. Gorky) | monuments of landscape gardening of national importance | Vinnytsia, 49°14′09″ N; 28°27′15″ E | First half of the 19th century | 1987 | 30.0 | July 2016 |
| **2** | "Podillia" Botanical Garden | monuments of landscape gardening of national importance | Vinnytsia 49°13′04″ N; 28°25′13″ E | 20th century (1963) | 1987 | 72.0 | July 2016 |
| **3** | M.I. Pirogov National Museum-Estate | monuments of landscape gardening of local importance | Vinnytsia 49°12′57″ N; 28°24′30″ E | 20th century (1944) | 1995 | 18.9 | July 2016 |
| **4** | Acad. O.I. Yushchenko Park | monuments of landscape gardening of local importance | Vinnytsia 49°12′53″ N; 28°26′26″ E | 1902 | 1972 | 15.0 | July 2016 |
| **5** | Nemyrivsky Park | monuments of landscape gardening of national importance | Nemyriv, 48°58′01″ N; 28°50′42″ E | 18th century (1787) | 1960 | 76.87 | June 2015 April 2016 |
| **6** | Sokiletsky Park | monuments of landscape gardening of local importance | Sokilets village, Nemyriv district 48°51′44″ N; 28°43′05″ E | 17th – 18th centuries | 1972 | 30.4 | June 2015 |
| **7** | Pechersky Park | monuments of landscape gardening of national importance | Pechera village Tulchin district 48°51′41″ N; 28°42′38″ E | End of the 17th century | 1984 | 19.0 | June 2015 |
| **8** | Kryzhopilsky Park | monuments of landscape gardening of local importance | Kryzhopil urban village, Kryzhopil district, 48°22′48″ N; 28°52′36″ E | End of the 19th century | 2009 | 29.0 | July 2016 |
| **9** | Verkhivsky Park | monuments of landscape gardening of national importance | Verkhivka village, Trostyanets district 48°26′31″ N; 29°08′53″ E | End of the 19th century (1891) | 1960 | 25.0 | September 2017 |
| **10** | Obodivsky Park | monuments of landscape gardening of national importance | Obodivka village, Trostyanets district 48°24′14″ N; 29°15′31″ E | End of the 19th century | 1960 | 17.0 | September 2017 |
| **11** | Leskivsky Park | monuments of landscape gardening of local importance | Leskove village, Monastyrishe district 48°59'37" N; 29°52'47"E | 18th century (1772) | 1996 | 89.0 | August 2017 |
| **12** | Shelpakhivsky Park | monuments of landscape gardening of local importance | Shelpakhivka village, Khrystynivka district 48°42'7"N; 29°55'1"E | 18th century | 2000 | 20.0 | April 2016 |
| **13** | Synytsky Park | monuments of landscape gardening of local importance | Synytsia village, Khrystynivka district 48°41′51″ N; 30°03′41″ E | 18th century | 1972 | 42.0 | April 2016 |
| **14** | National Dendrological Park "Sofiyivka" of NAS of Ukraine | monuments of landscape gardening of national importance | Uman town, Uman district 48°45′47″ N; 30°13′21″ E | 1796 | 1983 | 179.2 | 2015–2017 |
| **15** | Talnivsky Park | monuments of landscape gardening of national importance | Talne town, Talne district, 48°51′53″ N; 30°41′59″ E | End of the 19th century | 1960 | 406.0 | April 2016 June 2016 |

of no more than 30%. The sampling was made according to standard methods of phytosociological studies, with species cover recorded as a percentage. The plot size was 16 $m^2$. The relevés were stored in a TURBOVEG database (Hennekens & Schaminee 2001). The data analysis was performed in the JUICE program (Tichý 2002) using a modified TWINSPAN algorithm (Roleček et al. 2009) with one pseudo-species cut level at 1% and Sørensen dissimilarity index as a heterogeneity measure. Diagnostic species of the resulting vegetation units were determined using fidelity measure of phi-coefficient (Tichý & Chytrý 2006) using the Fisher's exact test at $p < 0.05$. Species with phi-coefficient values more than 0.4 were considered as highly diagnostic and more than 0.2 as diagnostic. For the syntaxonomic interpretation of the resulting units, Ukrainian sources (Solomakha 2008; Kuzemko 2016), as well as Czech and Slovak sources (Chytrý 2007; Janišova 2007), were used. Phytoindicative evaluation of the units made in the JUICE program used Didukh ecological scales on seven environmental factors: Hd (soil humidity), Rc (acidity), Sl (total salt regime), Ca (carbonate content in soil), Nt (nitrogen content), Ae (aeration of soil), Lc (light) (Didukh 2011). To identify distribution of the resulting units in multidimensional spaces of environmental factors, the DCA ordination (Hill & Gauch 1980) in the R-project software (Venables et al. 2011) was conducted.

## Results

As a result of the phytosociological analysis, six clusters were identified (Table 2).

***Cluster 1 – Lamium maculatum + Ficaria verna community***

Shaded mesic grasslands (lawns and shaded park grassland). They developed on well-moistened areas along rivers or streams, on meadows of small size, often shaded, sometimes with artificial watering. This group does not include newly created lawns, with floristic composition consisting of herbs whose seeds originate from grass mixtures used to establish the lawn. Instead, we include here lawns that are more than five years old, with unmanaged, spontaneous formation of the community (Fig. 2).

Total cover of the vegetation is usually high – 90–100%. The highest constancy was observed for *Geum urbanum*, *Glechoma hederacea*, *Phalacroloma annuum*, *Taraxacum officinale* and dominant species *Arrhenatherum elatius* and *Quercus robur* (juv.). The peculiarity of this community is the significant component of typical forest species and tree seedlings that penetrate into the community from the surrounding tree plantations. Obviously, in the absence of proper management (mowing), such communities would quickly turn into forest. This feature of the unit did not allow attribution to any known associations, since it clearly represents a succession stage.

The community was recorded in National Dendrological Park "Sofiyivka" of NAS of Ukraine, Nemyrivsky Park, Sokiletsky Park, Pechersky Park, Verkhivsky Park, Obodivsky Park, Synytsky Park, Talnivsky Park, Central City Park in Vinnytsia, "Podillia" Botanical Garden, Kryzhopilsky Park.

**Fig. 2. *Lamium maculatum + Ficaria verna* community (National Dendrological Park "Sofiyivka"). Photo: A. Kovtoniuk.**

**Fig. 3. *Lolietum perennis* Gams 1927 (Sokiletsky Park). Photo: A. Kovtoniuk.**

**Fig. 4. *Sagino procumbentis-Bryetum argentei* Diemont et al. 1940 (Nemyrivsky Park). Photo: A. Kovtoniuk.**

**Table 2. Synoptic table of the units of spontaneous grassland vegetation of gardens and parks of Middle Pobuzhzhia. The table includes only species with diagnostic value. The numbers in the columns correspond to the values of the phi-coefficient ×100: species with phi ×100 > 40 (highly diagnostic) are shaded in dark green, and > 20 (diagnostic) are shaded in light-green color.**

| Cluster number | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Number of relevés | 12 | 9 | 18 | 9 | 10 | 12 |
| *Lamium maculatum* | 58.9 | --- | --- | --- | --- | --- |
| *Acer campestre* | 51.9 | --- | --- | --- | --- | --- |
| *Ficaria verna* | 46.6 | --- | --- | --- | --- | --- |
| *Galium aparine* | 43.5 | --- | --- | --- | --- | --- |
| *Alliaria petiolata* | 40.5 | --- | --- | --- | --- | --- |
| *Lamium purpureum* | 37.8 | --- | --- | --- | --- | --- |
| *Gagea lutea* | 37.8 | --- | --- | --- | --- | --- |
| *Acer pseudoplatanus* | 37.8 | --- | --- | --- | --- | --- |
| *Stellaria holostea* | 37.8 | --- | --- | --- | --- | --- |
| *Tilia cordata* | 37.8 | --- | --- | --- | --- | --- |
| *Acer negundo* | 34.2 | --- | --- | --- | --- | --- |
| *Setaria viridis* | --- | 74.4 | --- | --- | --- | --- |
| *Portulaca oleracea* | --- | 72.2 | --- | --- | --- | --- |
| *Conyza canadensis* | --- | 71.4 | --- | --- | --- | --- |
| *Sagina procumbens* | --- | 58.4 | --- | --- | --- | --- |
| *Veronica hederifolia* | --- | 54.2 | --- | --- | --- | --- |
| *Galinsoga parviflora* | --- | 54.2 | --- | --- | --- | --- |
| *Polygonum aviculare* | --- | 50.4 | 19.2 | --- | --- | --- |
| *Amaranthus retroflexus* | --- | 45.1 | --- | --- | --- | --- |
| *Juglans regia* | --- | 43.9 | --- | --- | --- | --- |
| *Rorippa sylvestris* | --- | 43.9 | --- | --- | --- | --- |
| *Rorippa species* | --- | 43.9 | --- | --- | --- | --- |
| *Echinochloa crusgalli* | --- | 43.9 | --- | --- | --- | --- |
| *Amaranthus hybridus* | --- | 43.9 | --- | --- | --- | --- |
| *Poa annua* | --- | 40.8 | --- | --- | --- | --- |
| *Xanthoxalis stricta* | --- | 35.6 | --- | --- | --- | --- |
| *Lolium perenne* | --- | --- | 67.8 | --- | --- | --- |
| *Arctium lappa* | --- | --- | 40.9 | --- | --- | --- |
| *Plagiochila major* | --- | --- | 38.7 | --- | --- | --- |
| *Medicago sativa* | --- | --- | 37.8 | --- | --- | --- |
| *Geum urbanum* | --- | --- | 35.4 | --- | --- | --- |
| *Duchesnea indica* | --- | --- | 28 | --- | --- | --- |
| *Trifolium repens* | --- | --- | 27.9 | --- | --- | --- |
| *Artemisia obscura* | --- | --- | 25.6 | --- | --- | --- |
| *Ranunculus repens* | --- | --- | 25.6 | --- | --- | --- |
| *Achillea setacea* | --- | --- | 25.6 | --- | --- | --- |
| *Bromus mollis* | --- | --- | 25.3 | --- | --- | --- |
| *Trifolium pratense* | --- | --- | 21.9 | --- | --- | --- |
| *Taraxacum officinale* | --- | --- | 21.6 | --- | --- | --- |
| *Daucus carota* | --- | --- | --- | 65.1 | --- | --- |
| *Lotus corniculatus* | --- | --- | --- | 47.2 | --- | --- |
| *Cichorium intybus* | --- | --- | --- | 45.1 | --- | --- |

| Cluster number | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| *Echinops sphaerocephalus* | --- | --- | --- | 43.9 | --- | --- |
| *Betula pendula* | --- | --- | --- | 43.9 | --- | --- |
| *Brachypodium pinnatum* | --- | --- | --- | 43.9 | --- | --- |
| *Heracleum sibiricum* | --- | --- | --- | 43.9 | --- | --- |
| *Rumex crispus* | --- | --- | --- | 43.9 | --- | --- |
| *Genista tinctoria* | --- | --- | --- | 43.9 | --- | --- |
| *Linaria vulgaris* | --- | --- | --- | 43.9 | --- | --- |
| *Potentilla argentea* | --- | --- | --- | 37.1 | --- | --- |
| *Plantago lanceolata* | --- | --- | --- | 36.3 | --- | --- |
| *Veronica arvensis* | --- | --- | --- | 34.8 | --- | --- |
| *Potentilla obscura* | --- | --- | --- | 33.4 | --- | --- |
| *Medicago falcata* | --- | --- | --- | 31.7 | --- | --- |
| *Phalacroloma annuum* | --- | --- | --- | 29.6 | --- | --- |
| *Carex praecox* | --- | --- | --- | 27.9 | --- | --- |
| *Securigera varia* | --- | --- | --- | --- | 51.3 | --- |
| *Potentilla recta* | --- | --- | --- | --- | 50.7 | --- |
| *Centaurea jacea* | --- | --- | --- | --- | 47.9 | --- |
| *Pimpinella saxifraga* | --- | --- | --- | --- | 46.2 | --- |
| *Stachys recta* | --- | --- | --- | --- | 43.2 | --- |
| *Filipendula vulgaris* | --- | --- | --- | --- | 41.5 | --- |
| *Euphorbia cyparissias* | --- | --- | --- | --- | 41 | --- |
| *Veronica prostrata* | --- | --- | --- | --- | 41 | --- |
| *Medicago romanica* | --- | --- | --- | --- | 35.4 | --- |
| *Berteroa incana* | --- | --- | --- | --- | 33.8 | --- |
| *Leontodon autumnalis* | --- | --- | --- | --- | 30.9 | --- |
| *Ornithogalum umbellatum* | --- | --- | --- | --- | --- | 61.1 |
| *Phlomoides tuberosa* | --- | --- | --- | --- | --- | 60.1 |
| *Ranunculus polyanthemos* | --- | --- | --- | --- | --- | 39.4 |
| *Betonica officinalis* | --- | --- | --- | --- | --- | 37.8 |
| *Festuca rupicola* | --- | --- | --- | --- | --- | 37.8 |
| *Koeleria cristata* | --- | --- | --- | --- | --- | 37.8 |
| *Galium verum* | --- | --- | --- | --- | --- | 32.6 |
| *Knautia arvensis* | --- | --- | --- | --- | --- | 32 |
| *Viola odorata* | 34.5 | --- | 40.8 | --- | --- | --- |
| *Plantago major* | --- | 39.1 | 33.5 | --- | --- | --- |
| *Agrimonia eupatoria* | --- | --- | --- | 45.8 | 28.4 | --- |
| *Elytrigia repens* | --- | --- | 18.2 | 33.3 | 35.3 | --- |
| *Poa angustifolia* | --- | --- | --- | 32.4 | --- | 64.2 |
| *Achillea millefolium* | --- | --- | --- | 26.2 | 36.4 | --- |
| *Festuca valesiaca* | --- | --- | --- | --- | 48.3 | 34.4 |
| *Salvia pratensis* | --- | --- | --- | --- | 38.2 | 59.2 |
| *Centaurea scabiosa* | --- | --- | --- | --- | 36.2 | 36.2 |
| *Plantago media* | --- | --- | --- | --- | 32 | 44.4 |

***Cluster 2 – Lolietum perennis Gams 1927***

Open mesic grasslands (lawns and meadows). They are developed mainly in the floodplains of rivers and streams, in places receiving limited recreational use. They are almost indistinguishable from semi-natural grasslands (especially pastures) in their floristic composition (Fig. 3).

Total cover of community plots was usually high – 90-100%, but significantly lower with increasing anthropogenic pressure. The highest constancies were observed for *Achillea millefolium*, *Capsella bursa-pastoris*, *Convolvulus arvensis*, *Dactylis glomerata*, *Elytrigia repens*, *Polygonum aviculare* and dominant species *Lolium perenne* and *Poa pratensis.*

The considerable presence, in the floristic composition, of species resistant to trampling is noteworthy. Given their aesthetic attractiveness and proximity to rivers and other reservoirs, they are most often used in parks as picnic areas, but heavy use of these areas significantly affects their habitat condition, sometimes leading to complete degradation.

The community was revealed in National Dendrological Park "Sofiyivka", Nemyrivsky Park, Sokiletsky Park, Pechersky Park, Talnivsky Park, Central City Park in Vinnytsia, "Podillia" Botanical Garden, M.I. Pirogov National Museum-Estate, Acad. O.I. Yushchenko Park.

***Cluster 3 – Sagino procumbentis-Bryetum argentei Diemont et al. 1940***

This unit includes mesic and dry grassland communities that are developed under constant trampling along trails, around the most attractive architectural elements (gazebos, statues, fountains etc.) and in picnic sites. They can even develop in the cracks between pavement slabs (Fig. 4), being the final stage of anthropogenic transformation of mesic grasslands under the influence of trampling. This unit would be better attributed to synanthropic vegetation than to grasslands, but including it helps to illustrate the complete pattern of grassland vegetation of the gardens and parks, including the final stage of recreation process.

Total cover of communities usually high – 90–95%. The highest constancy is observed for *Convolvulus arvensis, Lolium perenne, Medicago lupulina, Taraxacum officinale, Trifolium repens* and the dominant species *Poa annua.*

The community was revealed in National Dendrological Park "Sofiyivka", Nemyrivsky Parkr, Sokiletsky Park, Pechersky Park, Talnivsky Park, Verkhivsky Park, Obodivsky Park, Leskivsky Park, Shelpakhivsky Park, Synytsky Park.

***Cluster 4 – Trifolio medii-Agrimonietum Müller 1962***

This community develops along thermophilous fringes or small clearings. In floristic composition, it is quite similar to natural fringes, but is characterized by a significant proportion of synanthropic species, due to the recreational influence (Fig. 5).

The highest constancies were observed for *Arrhenatherum elatius*, *Convolvulus arvensis*, *Dactylis glomerata*, *Festuca valesiaca*, *Medicago lupulina*, *Plantago media*, *Taraxacum officinale*, *Trifolium pratense*, *Trifolium repens* and *Viola hirta*. Dominant species in the vegetation plots were *Arrhenatherum elatius*, *Festuca valesiaca* and *Poa angustifolia*.

**Fig. 5. *Trifolio medii-Agrimonietum* Müller 1962 ("Podillia" Botanical Garden). Photo: A. Kovtoniuk.**

**Fig. 6. *Salvio pratensis-Poetum angustifoliae* Korotchenko & Didukh 1997 (Nemyrivsky Park). Photo: A. Kovtoniuk.**

Total cover of communities usually – 60–75%. The community was observed in National Dendrological Park "Sofiyivka", Central City Park in Vinnytsia, "Podillia" Botanical Garden, M.I. Pirogov National Museum-Estate, Acad. O.I. Yushchenko Park, Kryzhopilsky Park, Talnivsky Park.

***Cluster 5 – Salvio pratensis-Poetum angustifoliae Korotchenko & Didukh 1997***

This grassland community was usually found in open, unshaded areas and is the remnant of natural meadow–steppe vegetation that probably existed here before the park or garden was created. In most sites it develops on northern slopes or the bottom parts of slopes of different aspects. It probably experiences little recreational load (Fig. 6).

**Fig. 7. *Medicago romanicae-Poetum angustifoliae* Tkachenko et al. 1987 (National Dendrological Park "Sofiyivka"). Photo: A. Kovtoniuk.**

Total cover of the community is usually high – 75–90%. The highest constancies were observed for *Lotus corniculatus*, *Taraxacum officinale*, and dominant species are *Carex praecox*, *Elytrigia repens*, *Festuca valesiaca* and *Taraxacum officinale*.

Usually, the differences between this community and natural meadow steppes are fine and manifests in a larger proportion of synanthropic species. In the absence of proper care (mowing), degradation is observed due to an excessive accumulation of litter and the appearance of seedlings of trees and shrubs. However, with excessive mowing – more than twice during the growing season – their floristic composition is significantly impoverished.

The communities of this association were observed in National Dendrological Park "Sofiyivka", Nemyrivsky Park, Talnivsky Park and "Podillia" Botanical Garden.

***Cluster 6 – Medicago romanicae-Poetum angustifoliae Tkachenko et al. 1987***

This association develops in open, dry areas mainly on watersheds, southern exposures and the upper sections of slopes of various aspects (Fig. 7). In common with the previous unit, it is almost indistinguishable from natural meadow -steppe, and include a number of geophytes – *Ornithogalum umbellatum*, *Gagea lutea*, *Muscari botryoides*, *Leopoldia comosa* – as well as some rare species, including some listed in the Red Data Book of Ukraine (Didukh 2009). We found *Pulsatilla pratensis* in *Medicago romanicae-Poetum angustifoliae* in Sokilets Park. Formerly, *Pulsatilla pratensis* and *Stipa pennata* were also found in National Dendrological Park "Sofiyivka" (Tseshkovskiy 1927; Horyacheva 1960), but have now probably disappeared, having not been confirmed during last 50 years.

Total cover in the association plots was typically high, ranging from 80 to 95%. The highest constancies were observed for *Achillea millefolium*, *Agrimonia eupatoria*, *Arrhenatherum elatius*, *Centaurea jacea*, *Convolvulus arvensis*, *Medicago falcata*, *Taraxacum officinale* and *Veronica chamaedrys*. The principal dominant species were *Dactylis glomerata*, *Festuca valesiaca*, *Poa angustifolia* and *Salvia pratensis*.

The community was recorded in National Dendrological Park "Sofiyivka", Nemyrivsky Park, Talnivsky Park, Verkhivsky Park, Obodivsky Park, Leskivsky Park, Shelpakhivsky Park, Synytsky Park.

The syntaxonomy of the studied vegetation includes four classes of grassland vegetation:

***Molinio-Arrhenatheretea*** Tx. 1937

*Arrhenatheretalia elatioris* Tx. 1931

*Cynosurion cristati* Tx. 1947

Comm. *Lamium maculatum + Ficaria verna*

*Lolietum perennis* Gams 1927

***Polygono arenastri-Poetea annuae*** Rivas-Mart. 1975

*Polygono arenastri-Poetalia annuae* Tx. in Gehu et al. 1972 corr. Rivas-Mart. et al. 1991

*Saginion procumbentis* Tüxen & Ohba in Géhu et al. 1972

*Sagino procumbentis-Bryetum argentei* Diemont et al. 1940

***Trifolio-Geranietea sanguinei*** T. Müller 1962

*Origanetalia vulgaris* T. Müller 1962

*Trifolion medii* Müller 1962

*Trifolio medii-Agrimonietum* Müller 1962

***Festuco-Brometea*** Br.-Bl. & Tx. ex Soo 1947

*Brachypodietalia pinnati* Korneck 1974

*Cirsio-Brachypodion pinnati* Hadač & Klika in Klika & Hadač 1944

*Salvio pratensis-Poetum angustifoliae* Korotchenko & Didukh 1997

*Medicago romanicae-Poetum angustifoliae* Tkachenko et al. 1987

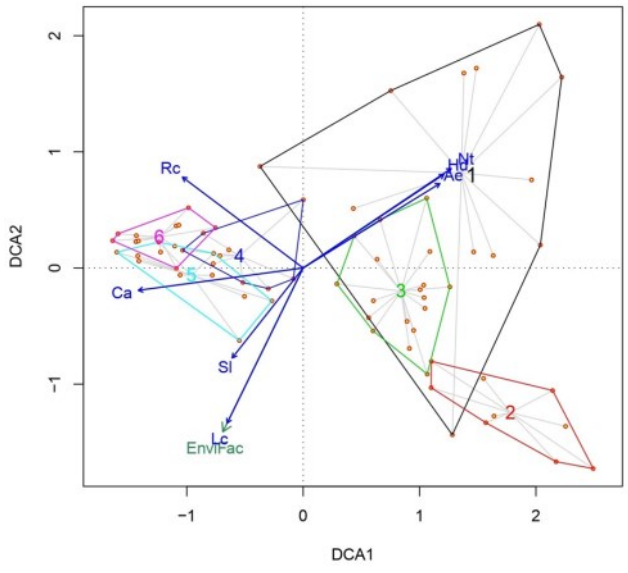


**Fig. 8. Results of the DCA-ordination of the clusters. Numbers of the units correspond to the numbers in the classification scheme. Environmental vectors correspond to the ecological values of Didukh (2011) – Hd (soil humidity), Rc (acidity), Sl (total salt regime), Ca (carbonate content in soil), Nt (nitrogen content), Ae (aeration of soil), Lc (light).**

The environmental features of the resulting clusters are well illustrated by the results of the DCA ordination using ecological scales of Didukh (2011). The clusters are divided into two groups: dry grasslands and mesic grasslands (Fig. 8).

The mesic grasslands group includes clusters 1–3. Cluster 1 is characterized by a wide range of environmental factors. It is located in the direction of higher soil fertility. Cluster 2 is shifted towards humidity. Cluster 3 occupies an intermediate position, although the communities of this cluster were also the most transformed.

Clusters 4, 5, 6 are displaced on the side of reduced humidity, giving reason to include them in the dry grasslands group. The narrower environmental amplitude of these three units is noteworthy, compared to the mesic group, and indicates a higher level of stability in their environmental conditions, as well as less adaptation to changes in the leading factors.

## Discussion

The spontaneous grassland vegetation of gardens and parks has, until recently, been largely beyond the attention of phytosociologists. Moreover, it has mostly been neglected by experts in plant breeding, gardening and landscape architecture. Most often, these parks were investigated only in terms of their potential as attractive grounds for recreational use. The focus of such studies were open-air equipment for playgrounds and street architecture, maintenance of flower beds or lawns and the aesthetic values of the garden.

This research into the vegetation has shown that these plant communities also need attention as an integral part of park landscapes, particularly in English-style landscape parks. Phytosociological analysis of grassland communities of the gardens and parks of Middle Pobuzhzhia has shown that, despite the constant recreational impact in artificially created areas, most of them are very close to semi-natural meadows and can easily be interpreted as phytosociological units. However, compared to natural grassland communities, they usually contain more synanthropic species, as a result of the intensive recreational use of many of the parks studied. Typically, a large component of tree and shrub seedlings, originating from the surrounding tree plantations, is found in the communities, as compared to natural grasslands. That is why, in the absence of proper care, these communities can quickly turn into coppices or forest. The study confirms the hypothesis that spontaneous grassland vegetation of gardens and parks is a sensitive indicator of their state and disturbance level and can be used for monitoring purposes. For the retention of grasslands in landscape gardens, there is a requirement for appropriate care, in particular mowing. In the absence of management, even under constant recreational influence/usage, there is typically a rapid accumulation of litter, which significantly reduces the aesthetic appeal of grassland landscapes, and subsequently, rapid encroachment of trees and shrubs.

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# On the trails of Josias Braun-Blanquet – changes in the grasslands of the inneralpine dry valleys during the last 70 years. First results from the 11th EDGG Field Workshop in Austria

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**Abstract**: The 11th EDGG Field Workshop was held from 6 to 13 July 2018 in Austria. Its aim was to revisit dry grasslands in the inneralpine dry valleys of Austria that were investigated in the late 1950s by Braun-Blanquet and to collect high-quality biodiversity data from these. Sampling was carried out in the Styrian Mur Valley, the Virgen Valley in East Tyrol, the Upper Inn Valley in the Austrian Eastern Alps, and Griffen in Carinthia. In total, we sampled 15 EDGG biodiversity plots and 37 additional 10 m² plots. Butterfly data were recorded in four biodiversity plots and two additional plots. We found maximum richness values of 49, 68 and 95 vascular plant species on 1, 10 and 100 m², while the corresponding values for the complete terrestrial vegetation were 56, 73 and 106 species. Maximum butterfly richness was 19, but it was in general quite low, and generalists dominated. Some of the areas originally studied by Braun-Blanquet were no longer dry grasslands and only a few sites remained largely unchanged. Detrended Correspondence Analysis (DCA) showed profound changes between the old (1950s and 1980s) and our current plots. Without grazing or other human land management activities, only very small cores of rocky dry grassland could survive in the comparatively humid Austrian inneralpine valleys. Finally, the sampled data raise questions about the syntaxonomic position of some of the grasslands, which needs to be addressed in a more comprehensive study, which is planned as the next step.

**Keywords**: Austria; biodiversity; bryophyte; butterfly; dry grassland; Eurasian Dry Grassland Group (EDGG); inneralpine dry valley; lichen; nested plot; species richness; syntaxonomy; vascular plant.

**Nomenclature**: Names of vascular plants, bryophytes and lichens are according to the Austrian species list of Turboveg (January 2019), mostly based on Fischer et al. (2008), Frahm & Frey (2004) and Nimis et al. (2018), respectively. Names of butterflies follow Wiemers et al. (2018).

**Abbreviations:** DCA = Detrended Correspondence Analysis; EDGG = Eurasian Dry Grassland Group; EIV = Ellenberg Indicator Value; EIV_C: EIV for continentality; EIV_N: EIV for nutrients; EIV_M: EIV for moisture; EIV_R: EIV for soil reaction; EIV_T: EIV for temperature; EIV_L: EIV for light.

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## Introduction

Since 2009, the Eurasian Dry Grassland Group (EDGG) has carried out 13 Field Workshops for collecting high-quality biodiversity and compositional data of grassland vegetation in under-sampled parts of the Palaearctic (Dengler et al. 2016a; Dengler et al. 2019). Despite the main goal of EDGG Field Workshops being to collect data on vascular plants, bryophytes and lichens, specialists in other taxonomic groups are encouraged to participate. Data collected during these expeditions have already been used for a series of regional studies on phytosociological classification (Dengler et al. 2012; Pedashenko et al. 2013; Kuzemko et al. 2014) and patterns and drivers of plant diversity (Turtureanu et al. 2014; Kuzemko et al. 2016; Polyakova et al. 2016) as well as for a comparative overview on mean and maximum richness values of Palaearctic grasslands (Dengler et al. 2016b). To facilitate the broad scientific utilization of the multi-scale vegetation plot data from EDGG Field Workshops, these are fed into the "GrassPlot" database of EDGG (Dengler et al. 2018; Biurrun et al. 2019), which is used for several projects dealing with alpha and beta diversity, such as the recently published overarching study on species-area relationships in Palaearctic grasslands (Dengler et al. 2020b).

Here we report on the 11th EDGG Field Workshop in the inneralpine valleys of Austria, held from 6 to 13 July 2018, and present some initial findings. This event was organized by Martin Magnes, Helmut Mayrhofer (both Institute of Biology, University of Graz) and Philipp Kirschner (Institute of Botany, University of Innsbruck, and Nature Park Kaunergrat). The main aims were (i) to collect multi-scale and multi-taxon biodiversity data from the dry grasslands in the region, (ii) to examine the present state of the Austrian sites Braun-Blanquet had sampled in the 1950s, and (iii) to resolve the position of the stands in the current syntaxonomic system.

## The 11th EDGG Field Workshop

In the Field Workshop, 19 scientists from 10 European countries (Austria, Bosnia-Herzegovina, Italy, Montenegro, Poland, Russia, Slovakia, Spain, Switzerland and Ukraine) participated, mostly botanists, but also one zoologist specialized in butterflies (A. Mora) (Fig. 1). After the field work, additionally C. Berg was involved with bryophyte determination and E. Afif with soil analyses.

Based on pre-excursions, only three Austrian regions investigated by Braun-Blanquet (1961) were appropriate for a detailed re-investigation with a big group: the middle section of the Mur Valley in Styria (the most eastern part of the inneralpine dry valleys in the sense of Braun-Blanquet), the Virgen Valley in East Tyrol and the Upper Inn Valley south east of Landeck (Fig. 2). The three regions are positioned along a gradient of continentality: the most continental Upper Inn Valley near the centre of the biggest mountain mass of the Alps is followed by the Styrian Mur Valley near the eastern border of the Alps and, between them, the Virgen Valley in East Tyrol with climatic influences from the Mediterranean (see Magnes et al. 2018). An additional half-day sampling took place in Carinthia, on the castle hill of Griffen, as Braun-Blanquet (1961) also worked on this location, which lay on our way back to Graz. During eight days, we collected data in 15 EDGG biodiversity plots (nested-plot series) and 37 additional 10 $m^2$ plots. They are distributed from 47.00566 to 47.70428° N, from 10.60588 to 14.92244° E and from 549 to 1,955 m a.s.l. (Fig. 2).

## The four study regions in detail

### *Mur Valley in Styria*

Braun-Blanquet (1961) identified the upper part of the Styrian Mur Valley as the easternmost extension of the inneralpine dry valleys. The nearest climatogenic dry grasslands can be found on the eastern foothills of the Eastern Alps, approximately 130 km northeast, already influenced by the continental climate of the Pannonian Basin (Magnes 2018a; Magnes et al. 2018). The first destination of our field workshop was the famous Gulsen near Kraubath, the largest serpentinite outcrop of Central Europe (Brooks 1987).

Besides some typical dry grassland species, like *Silene otites*, which occurs nowhere else in Styria, we saw also the palaeoendemic *Sempervivum pittonii* in full flower (Fig. 3), *Notholaena marantae* (Fig. 4), in Central Europe only known from serpentinite, and the rare liverwort *Mannia fragrans*. Although grazing by goats ceased before the 1950s (Fig. 5) and part of the former dry grasslands are now *Pinus sylvestris* forest or forest steppes, the very steep southern slopes of Gulsen, near the quarry, still host the only primarily climate induced Styrian dry grasslands (Magnes 2018b) - we were unable to visit them unfortunately.

Other targets in the Mur Valley region were Oberkurzheim near Pöls, in a tributary valley of the Mur upstream from Gulsen, the Puxerloch north of Teufenbach and shortly re-established grasslands around a siliceous rock near Neumarkt. Pöls is the only known site of *Stipa styriaca* (Fig. 6),

**Fig. 1. The group at the Gottschaunalm (1,934 m a.s.l.), East Tyrol. Photo: J. Dengler.**

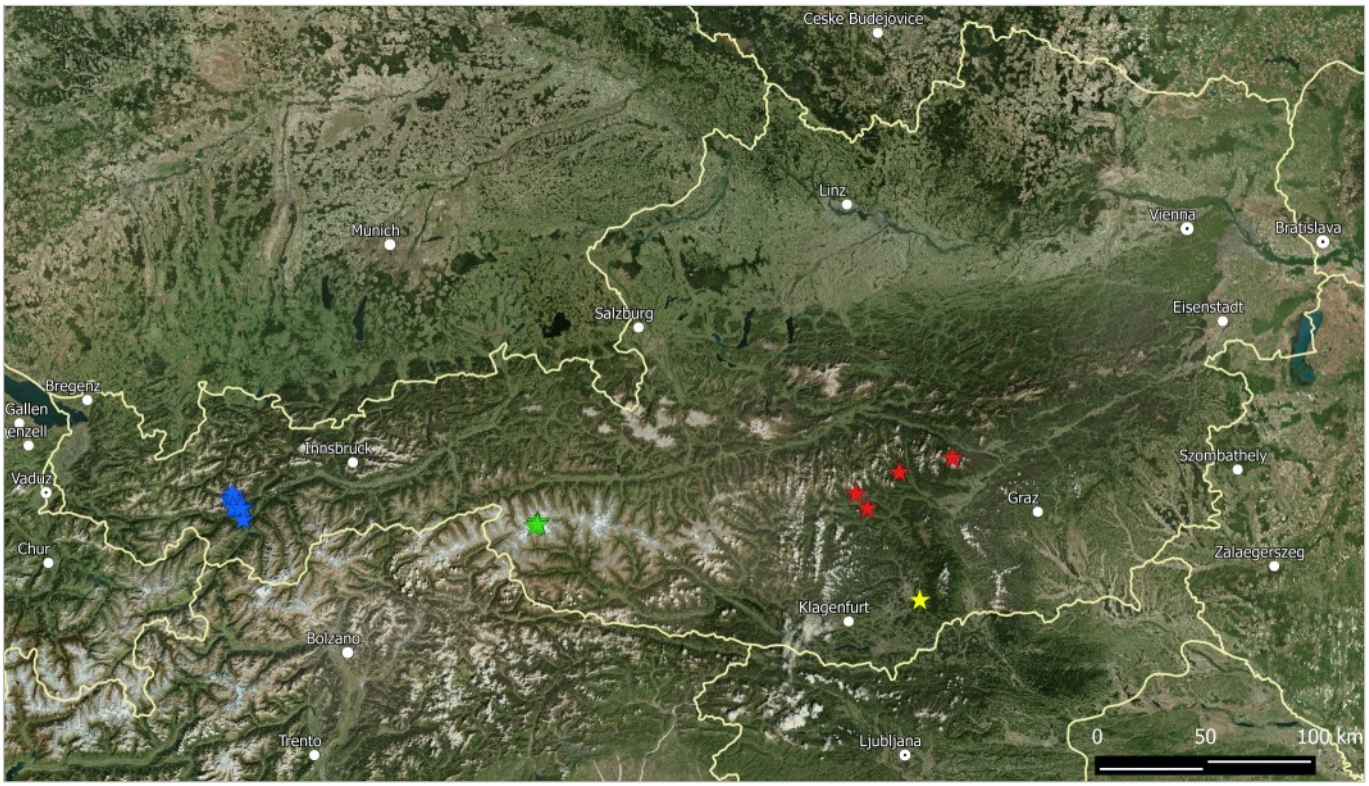


**Fig. 2. Localities of the plots of the 11th EDGG Field Workshop (blue: Upper Inn Valley, green: Virgen Valley; red: Mur Valley, yellow: Griffen) Source: Bing Maps (Microsoft, Redmond, USA).**

**Fig. 3. The palaeoendemic *Sempervivum pittonii*, Gulsen. Photo: M. Magnes.**

**Fig. 4. *Notholaena marantae*, a poikilohydric fern, Gulsen. Photo: M. Magnes.**

but this place was not visited by Braun-Blanquet (1961), as the species was first found by Melzer in 1962 (Melzer 1962) and later recognized and described as a new species (Martinovksy 1970). Probably this *Stipa* population could survive the climate conditions during the warmer and more humid postglacial periods on the rocks of black mica schist above the dry grassland, which heat up in summer. With the exception of Neumarkt, all the sites showed typical signs of woody and ruderal encroachment following abandonment. *Brachypodium pinnatum* had high cover values, indicating that clearing and mowing was severely needed after several years without grazing (Fig. 7). As typical for early fallows, the species richness was very high (more than 60 species on 10 $m^2$ on a plot in Pöls).

***Virgen Valley in East Tyrol***

The region is not as arid as all the other studied sites, but the annual temperature amplitude is very high. The winters are bitterly cold at about 1,400 m a.s.l., but *Triticum aestivum* was cultivated here until the 1980s. The moderate aridity in this part of Austria is remarkable, as the Virgen Valley is situated south east of the giant mountain massif Großvenediger and is also shielded from the south by the Lasörling range. Our targets were: a never fertilized hay meadow that is cut not earlier than August (Marin); a subalpine hay meadow ("Bergmähder", on southeastern slopes of the Zinizachspitze); and a pasture around a rock outcrop ("Burg" Obermauern).

In the first week of July, the mean height of the plants on the never fertilized, steep meadow in Marin was less than 30 cm, the endemic *Onobrychis arenaria* subsp. *taurerica* was in full bloom and we recorded up to 59 species on 10 $m^2$.

The steep southeast-facing slopes of the Zinizachspitze are partly non-forested because of frequent avalanche damages, but were also used for haymaking until recently. In this site and the high-elevation meadow above Kauns in the Upper Inn Valley, were found the highest species richness on 10 $m^2$ during our Field Workshop. This included rare species, such as *Astragalus penduliflorus*, *Pedicularis elongata, Oxytropis campestris* and *Festuca norica*.

**Fig. 5. View to the southern slopes of Gulsen 1954 and 2005. Left photo: J. Eggler, from Eggler (1955), right photo: M. Magnes.**

**Fig. 6. Habitat of *Stipa styriaca* near Pöls. Photo: M. Janišová.**

Our last site in Virgen was the "Burg" in Obermauern, a small hill of limestone mica schist, partly covered with moraine material, with a maximum elevation of 1,416 m a.s.l. The area has been used as a pasture for cattle but nevertheless some parts of the former larger areas of rocky grassland are now overgrown by *Juniperus sabina* – the former traditional grazing was obviously more intensive. Besides the flowering *Dianthus sylvestris* there were also other typical species for inneralpine valleys such as *Festuca valesiaca, Poa badensis* and *Mannia fragrans.*

***Upper Inn Valley south east of Landeck***

The next sampling location was the Upper Inn Valley south east of Landeck, where we arrived after crossing the Alpine divide through the Felber Tauern tunnel and the Pass Thurn. The dry grasslands of the Upper Austrian Inn Valley were treated together with the Lower Engadine by Braun-Blanquet (1961) because of the similarity in geology, aridity of the climate but also the dry grassland vegetation.

Geologically, the Kaunerberg and the study sites below the castle Laudegg belong to the easternmost part of the Engadine window. This tectonic window exposes a complex series of some of the oldest geological units of the Eastern Alpine system (Gruber et al. 2010).

The studied dry grassland sites in the area bear witness to an old cultural landscape. Traditionally, these sites were common land and were used to pasture small livestock (mainly sheep, to a lesser extent goats) in spring and autumn, before and after they were summered on the alpine pastures at higher elevations. This utilization dates back to at least the Medieval period but it is likely much older. Until the 1940s and early 1950s, several hundred animals were herded in the slopes below Fließ. This practice was however

**Fig. 7. Tall growing semi-dry grassland near Pöls with the dark mica schist outcrops. Photo: J. Dengler.**


**Fig. 8. The Fließer Sonnenhänge 1955 and 2018. Photos: Naturpark Kaunergrat (left), P. Kirschner (right).**

abandoned due to the economic upturn of the post-war era, and led to a reforestation and a subsequent degradation of the respective sites (Fig. 8). This negative trend lasted until 2002, when, following the year-long pressure of regional conservationists, the sites at Fließ were finally put under protection, and were integrated into the Natura 2000 network. The sites at Kauns-Kaunerberg followed shortly after, and have been protected under Tyrolean law since 2006. Both sites have been managed by the Nature Park Kaunergrat since then. Management measures include the initial re-establishment of degraded areas by removal of shrubs and trees, and subsequent, targeted grazing by cattle, goats and sheep. Since implementation, these activities have been regularly evaluated via monitoring studies on vegetation and selected insect taxa (butterflies, ants), coordinated by the Kaunergrat Nature Park. Despite some degradation, the dry grasslands in the region are still the best example of inneralpine dry valleys in Austria, and the activities of the members of the Naturpark Kaunergrat have led to an improvement of the situation.

***Griffen in Carinthia***

On the last day of the Field Workshop we sampled one last 10-m$^2$ plot at the southern slope of the Griffener castle hill, a place that had already been investigated by Braun-Blanquet (1961). Since the municipality Griffen has bought the castle hill, parts within the security walls of the castle have been cleared and are mown regularly. The place has a promising potential not only to attract tourists but to develop species-rich grassland.

## Initial results and discussion

***Phytodiversity***

As mentioned before 15 EDGG biodiversity plots (nested-plot series) and 37 additional 10 m$^2$ plots were sampled. The most frequent vascular plants in the 67 10 m² plots were *Euphorbia cyparissias* (56.7%), *Carex humilis* (55.2%), *Carex caryophyllea* (52.2%) and *Helianthemum nummularium* subsp. *obscurum* (52.2%). Among bryophytes, *Abietinella abietina* (56.7%) and *Rhytidium rugosum* (46.3%) were the most frequent species. Lichens were present only in a subset of plots, so that the most frequent species, *Cladonia pyxidata* and *C. symphycarpa*, reached only 16.4% and 14.9% in the whole dataset, respectively. Fig. 9 shows some of the lichens observed during the Field Workshop.

Mean total species richness ranged from 3.0 on 1 cm² via 28.3 on 1 m², 41.5 on 10 m² to 69.1 on 100 m² (Table 1). Most of the species were vascular plants with on average 34.1 on 10 m², followed by 4.2 bryophytes and 2.0 lichens, but for the latter two groups the diversity varies much between plots (Table 1). Maxima of total species richness were

**Table 1. Preliminary species richness data from the 11th EDGG Field Workshop in Austria.**

| | | Total richness | | Vascular plants | | Bryophytes | | Lichens | |
|---|---|---|---|---|---|---|---|---|---|
| Area [m²] | *n* | Mean | Range | Mean | Range | Mean | Range | Mean | Range |
| 0.0001 | 30 | 3.0 | 1–9 | 2.4 | 0–8 | 0.3 | 0–3 | 0.1 | 0–2 |
| 0.001 | 30 | 4.8 | 0–11 | 3.9 | 0–11 | 0.5 | 0–3 | 0.2 | 0–2 |
| 0.01 | 30 | 8.2 | 1–19 | 6.7 | 0–18 | 0.9 | 0–5 | 0.4 | 0–2 |
| 0.1 | 30 | 17.4 | 6–36 | 14.5 | 4–33 | 1.8 | 0–6 | 0.8 | 0–4 |
| 1 | 30 | 28.3 | 10–54 | 23.6 | 9–49 | 2.6 | 0–7 | 1.6 | 0–9 |
| 10 | 67 | 41.5 | 20–90 | 34.1 | 16–86 | 4.2 | 0–17 | 2.0 | 0–14 |
| 100 | 15 | 69.1 | 38–103 | 55.6 | 25–94 | 6.9 | 2–16 | 5.8 | 0–17 |


**Fig. 9. Some of the lichens determined by our lichenologist (H.M.): 1: *Toninia sedifolia* (left, the dark one) and *Fulgensia bracteata*, Photo: J. Dengler; 2: *Buellia elegans*, Photo: J. Dengler; 3: *Cladonia pyxidata* (left) and *Peltigera rufescens*, Photo: J. Dengler; 4: *Xanthoparmelia stenophylla*, Photo: J. Dengler; 5: *Thamnolia vermicularis* var. *subuliformis*, Photo: M. Magnes, 6: *Peltigera membranacea*, Photo: J. Dengler.**

54, 90 and 103 on 1, 10 and 100 m², respectively, and 49, 86 and 94 for vascular plants (Table 1).

The Virgen Valley was the region with the highest mean species numbers at all plot sizes. The high values cannot be explained only by the extremely species-rich high mountain meadows, as the values remained still the highest for this region even after excluding the relevés coming from such meadows from the richness calculations. The regional species richness is probably positively influenced by the least arid climate among the studied regions. High aridity, especially in the Alps, can influence species richness negatively. For example, Wiesner et al. (2015) pointed out the conspicuous species poorness of *Festuco-Brometea* grasslands in the Aosta Valley area. Of similar importance is the tradition-

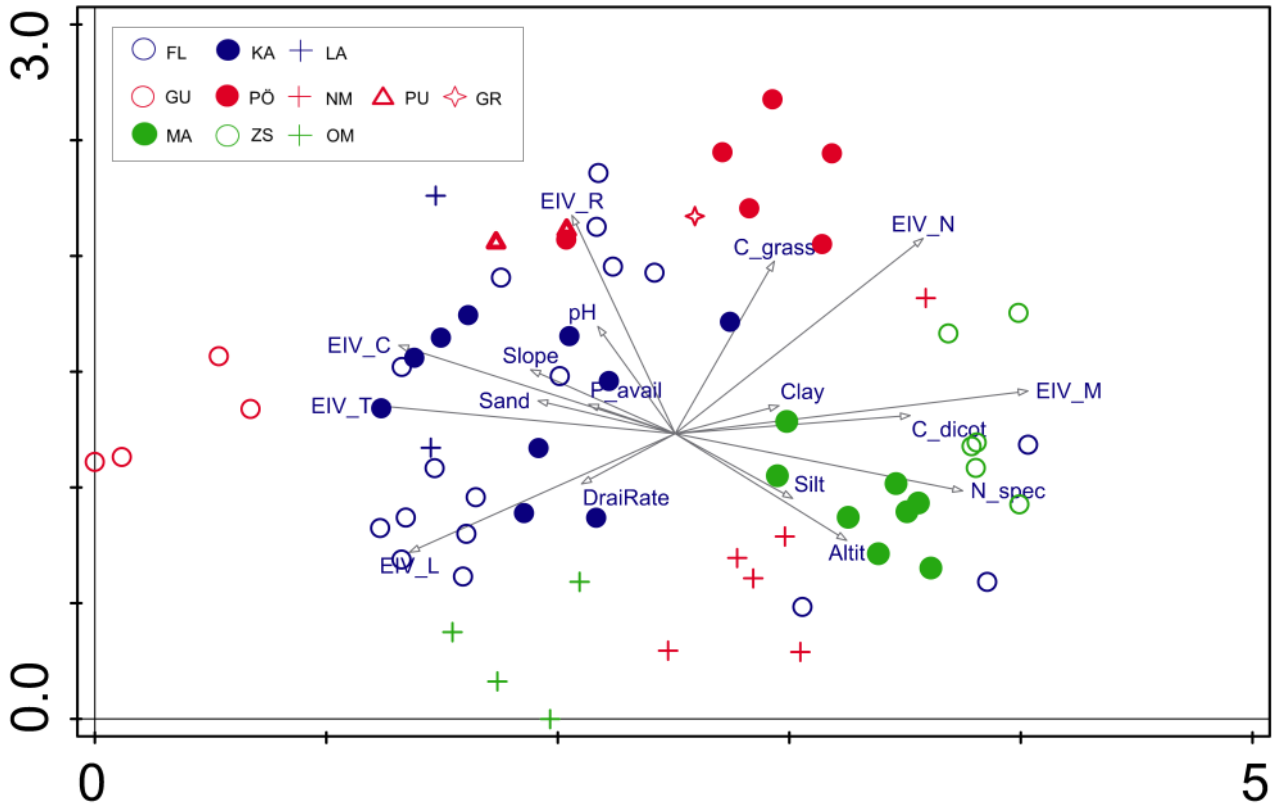


**Fig. 10. DCA plot of the 10 m$^2$ plots sampled during the 11$^{th}$ EDGG Field Workshop (cover values log-transformed, gradient lenght/eigenvalue of Axis 1: 4.03/0.5048, Axis 2: 2.68/0.2823); blue: Upper Inn Valley: FL Fließ, KA Kauns, LA Ladis; red: Mur Valley and Griffen: GU Gulsen, PÖ Pöls, NM Neumarkt, PU Puxerloch, GR Griffen; green: Virgen Valley: MA Marin, ZS Zinizachspitze, OM Obermauern; vectors: pH (measured, in Aqua dest.), DraiRate: Drainage rate, measured, P_avail: Phosphorus available, measured in Mehlich 3 method; Sand, Silt, Clay in percent; N_spec: species number per plot; C_grass: cover grass species; C_dicot: cover dicotyledones, Altit: altitude; Slope: average slope inclination; EIV = Ellenberg Indicator Value, EIV_C: EIV for continentality; EIV_N: EIV for nutrients, EIV_M: EIV for moisture; EIV_R: EIV for soil reaction; EIV_T: EIV for temperature; EIV_L: EIV for light.**

al management of the pastures and meadows practiced continuously until recent times in the Virgen Valley. The second richest region was the Upper Inn Valley. This region, the most continental of all our study areas, has a long grazing tradition and the large pastures were used from spring until the flocks of sheep and goats could move to the high-mountain pastures – in some years not before July. The last region with regards to species richness is the Styrian Mur Valley. Most of the sites are rather small remnants and pasturing ceased around the 1950s. Even the grasslands of Gulsen, while hosting interesting specialists, were rather species poor because of the serpentinite affecting the soil chemistry.

***Vegetation composition and vegetation change***

We conducted a Detrended Correspondence Analysis (DCA) with the 10 m$^2$ plots sampled during the Field Workshop to show the differences in species composition between the sampling locations, and the environmental gradients behind them (Fig. 10). For this purpose, we passively plotted in the DCA diagram Ellenberg Indicator Values (EIV) calculated for each plot as well as several environmental variables, namely altitude and measured soil parameters. Although the aridity (especially summer drought) in the Austrian parts of the inneralpine dry valleys is never as severe as in the Western or Southwestern Alps, this gradient is visible in the compositional data and is indicated by the vector of the EIV (not weighted mean) for continentality (EIV_C). The other important gradient in the compositional data is the soil reaction: both the vector of the EIV for soil reaction (EIV_S) and the vector of the measured pH go nearly parallel to axis 2 in the DCA plot.

DCA was used to analyse the plots sampled during the Field Workshop together with the historical plots (Kielhauser 1953, 1954; Braun-Blanquet 1961; Wagner 1985). The resulting ordination diagram is shown in Fig. 11. Figs. 10 and 11 show that plots from Gulsen (GU) occupy a distinct position, both recent plots and historical plots sampled by Braun-Blanqet (blue encircled plots in Fig. 11). This distinct position reflects not only the different flora on serpentinite but

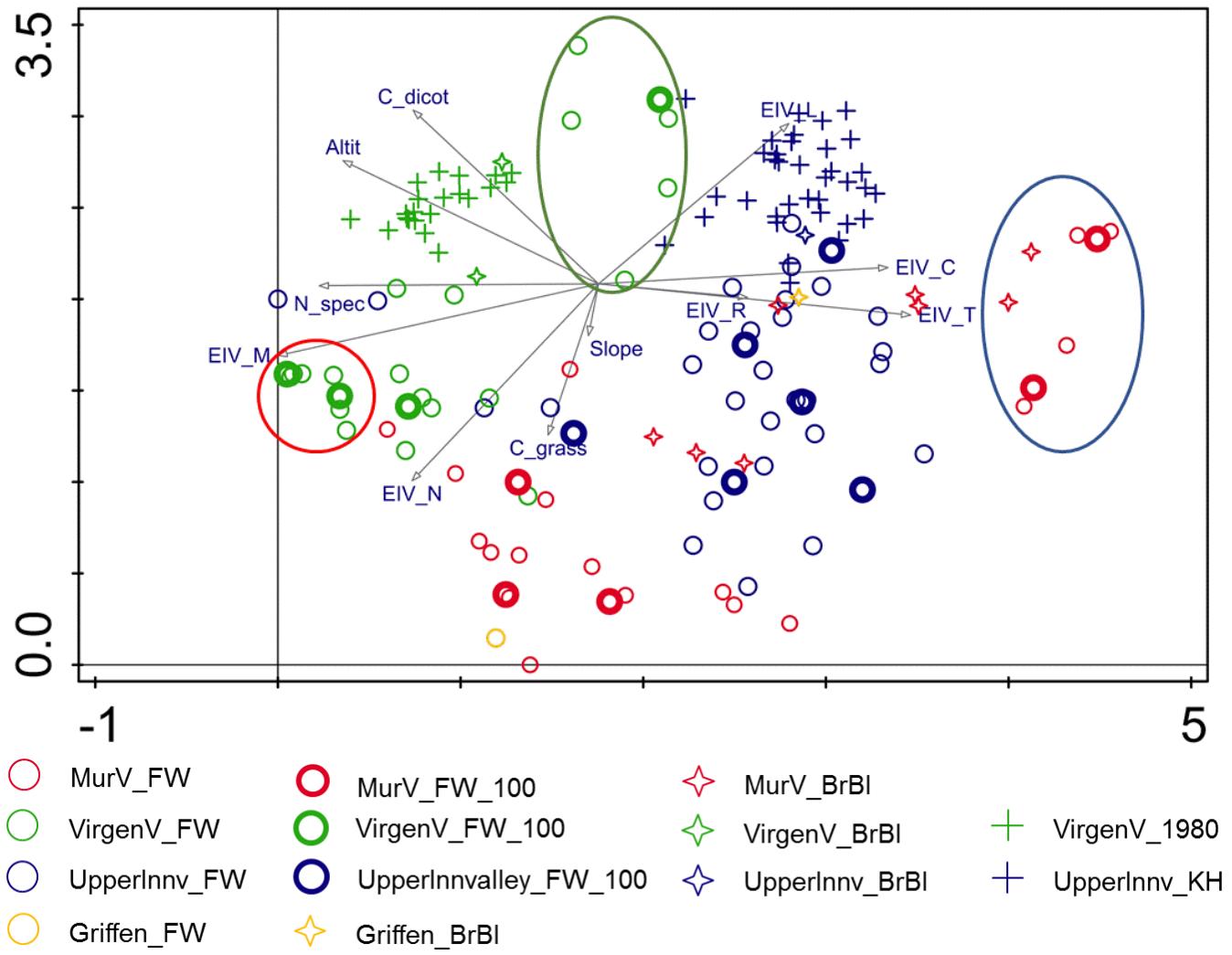


**Fig. 11. DCA plot of the relevés sampled during the 11th EDGG Field Workshop (x_FW: data from the 10 m² plots; x_FW_100: data from the 100-m² plots) together with relevés from the Austrian Inneralpine dry valleys sampled in the 1950s and 1980s (Braun-Blanquet 1961: x_BrBL, Kielhauser 1953 and 1954: x_KH and Wagner 1985: x_1980); blue circled plots: Gulsen, green circled plots: Obermauern, red circled plots: Zinizachspitze; cover values log-transformed, gradient lenght/eigenvalue of Axis 1: 4.56/0,539, Axis 2: 3.39/0,318). Vectors: N_spec: species number per plot; C_grass: cover grass species; C_dicot: cover dicotyledones, Altit: altitude; Slope: average slope inclination; EIV = Ellenberg Indicator Value, EIV_C: EIV for continentality; EIV_N: EIV for nutrients, EIV_M: EIV for moisture; EIV_R: EIV for soil reaction; EIV_T: EIV for temperature; EIV_L: EIV for light. To test whether the larger plot sizes of the previous authors are not the most important drivers of the different compositional variability (affecting the positions in the DCA ordination space) for the comparison with the historical relevés we included also the data from the 100 m² plots (x_FW_100). The species cover values were calculated by averaging the values obtained in the two 10 m² corner-plots, while the species occurring only outside the corner plots got the cover value 0.1.**

also the relative species poorness caused by this Mg-rich bedrock. This is the only region where the recent sites appear on more continental and dryer parts of the gradient than those from the 1950s.

The distinct position in the DCA of the grasslands from Virgen Valley mediates between the Mur Valley and the more continental sites of the Upper Inn Valley. Both the species rich subalpine hay meadows on the slopes of the Zinizachspitze (red circle in Fig. 11) and the rocky grasslands on the moraine material near the valley bottom in Obermauern (green circle in Fig. 11) form distinct groups. Fig. 11 also evidences the compositional distance among old and recent plots from Kaunergrat (Upper Inn Valley), probably due to the decrease in light demanding species. The large distance between the recent and the historical plots from Griffen in the DCA of Fig. 11 can be explained by the different ecological situation of the sites: while Braun-Blanquet (1961) was working in rocky grassland, our group sampled a site within the Castle area to obtain information on the quality of the management.




**Fig. 12. Some *Lepidoptera* species of the studied grasslands: 1: *Rhuemaptera hastata*, 2: *Parnassius apollo*, 3: *Melitaea* sp. (det. A. Mora). Photos: J. Dengler.**

***Butterflies***

Four out of the 15 biodiversity plots and two out of the 37 additional plots were also sampled for butterflies (see Fig. 12 for examples). Specific weather conditions (over 17º C, no rain or heavy winds) have to be met to sample butterflies, which is very different to sampling plants. The plot surface was walked through to cover all the different biotopes for butterflies. Plot area and observation time were recorded in each case. All species were identified. Standardized adult counts (Pollard & Yates 1993) were accomplished when possible (four out of the six sites sampled). Information about land-use and landscape context was also recorded.

Butterfly species richness was calculated for each sampled site, as well as the percentage of specialist species (larvae feeding only on 1 or 2 host plants), the percentage of generalist species (larvae feeding on more than 10 species), and the average fore-wing length of the species present (as a proxy for butterfly mobility). Host plants and fore-wing lengths were consulted in Paolucci (2013), and host plants for sampled butterfly species were identified in the species lists obtained in the sampled plots.

The highest butterfly species richness was found in Zinizachspitze (Virgen Valley) (19 species sampled), with a remarkable 26% of grassland specialists (with only 1 or 2 host plants for larvae) and some interesting species, such as the endangered *Phengaris arion* (Van Swaay et al. 2010), or *Coenonympha gardetta*, *Erebia albergana* and *Aricia artaxerxes*. In this location, 18 possible functional associations between host plants and butterfly species were detected, the highest number for all sites visited. Interestingly, two of the uncommon species sampled in this location, *Phengaris arion* and *Aricia artaxerxes* have symbiotic relationships with ants, who attend their larvae and pupae (*Myrmica sabuleti* or *M. scabrinodis* for *Phengaris arion* and *Lasius* spp. for *Aricia artaxerxes*). All these data suggest that land-use has been stable for a long time and that the plot is not isolated in the landscape (there is enough area to sustain viable metapopulations).

In the other five sites sampled, simple communities with few species were found, with very uneven distribution of abundances (one or two dominating species) and few possible associations between plants and butterflies. The average fore-wing length was bigger in these poorer and more disturbed places, suggesting recent disturbance and recolonization only by highly mobile and generalist species. Other recorded species of interest were *Neptis rivularis* in Pöls, typical of the original mixed deciduous woodland of the location, a sporadic and uncommon species after Paolucci (2013). *Parnassius apollo*, considered Near Threatened in the European Red List (Van Swaay et al. 2010) was found in three localities (Fig. 12).

Reduction in landscape variety by means of intensified agriculture and forest plantations has led to the simplification of butterfly communities, dominated by generalist and highly mobile species. Dainese et al. (2017) demonstrated for 561 seminatural grasslands across seven European regions that local plant diversity showed a strong bottom-up effect on butterfly diversity in the most complex landscapes, but this effect disappeared in simple landscapes. Our observations support this hypothesis.

## Conclusions and outlook

The first insights into the dry grasslands of the inneralpine valleys of Austria demonstrate that they are an interesting study subject despite their small remaining areas. They are dependent on management measures to preserve their special species composition - which has been recently updated and documented by the data generated during this Field Workshop. The region with the best preserved traditional agronomy, the Virgen Valley, especially the subalpine meadows (also these in the Upper Inn Valley) harbor the highest plot-scale species richness of vascular plants, bryophytes and lichens. The butterfly investigation showed similar results. The data have already been fed into the GrassPlot database (Dengler et al. 2018; Biurrun et al. 2019) to be used in supraregional biodiversity studies across the Palaearctic. Participants of the Field Workshop plan two follow-up studies, one on the syntaxonomic assignment of the studied grasslands and one on the butterfly communities. Of particular interest will also be the comparison with the results of the 12th EDGG Field Workshop in the inneralpine valleys of Switzerland (Dengler et al. 2020a).

## Author contributions

M.M. organised the Field Workshop together with H.M. and P.K. He also wrote the first draft of the text. J.D., I.B. and I.D. as the past and current EDGG Field Workshop Coordinators provided and ensured the standardised methodology and gave major input to the report. A.M. sampled butterflies and wrote the corresponding section. P.K., M.J., H.M., C.B., E.A. and W.W. made significant contributions, E.B., I.B., M.J. and M.M. jointly compiled the photo diary in the Appendix. All authors were involved in the field sampling except C.B. who determined bryophytes and E.A. who analysed soils. Many authors contributed photos (see captions). All authors read and approved the manuscript.

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# Appendix: a photo diary of the Field Workshop

Edited by Elena Belenovskaya, Idoia Biurrun, Monika Janišová & Martin Magnes

**6 July – Mur Valley: Gulsen near Kraubath**
The meeting point was at the Institute of Biology, Division of Plant Sciences in the Botanical Garden of the University of Graz, a second part of the group was collected at the railway station in Bruck an der Mur. Bad weather and rain couldn't spoil the pleasure of our meeting. After joyful greetings we moved to Gulsen, the biggest serpentinite outcrop of Central Europe. We climbed the steep forest steppe part up to the even steeper treeless rocky grassland areas. *Sempervivum pittonii* was in flower and other plants that in Central Europe are often restricted to serpentinite were fully developed.
As a bonus, we had a wonderful dinner and comfortable accommodation in the hospitable Pöllauer Hof.

**The steep slopes of the Gulsen. Photo: M. Janišová.**

**Discussing plant and lichen species on the Gulsen. Photo: M. Janišová.**

**The Gulsen dry grassland through the butterfly specialist´s eye (*Cucullaria verbasci* on *Verbascum chaixii* subsp. *austriacum*, det. M.M). Photo: A. Mora.**

**Dinner at the hospitable Pöllauer Hof. Photo: J. Dengler.**

**For identification of our plants, there is enough space in the smallest lobby. Photo: J. Dengler.**

**7 July – Mur Valley: Oberkurzheim near Pöls; Puxerloch, Neumarkt in der Steiermark**

We were woken up by the bell of the nearby church of Pöllau. The morning was bright and sunny and the day also promised to be nice. After a nice big breakfast, our first site was Oberkurzheim near Pöls, where we met Peter Hochleitner, who had organized the re-introduction of management on the last habitat of *Stipa styriaca*.

**Oberkurzheim, near the habitat of *Stipa styriaca*. Photo: J. Dengler.**

***Stipa styriaca* grassland evoked smiles on scientists' faces. Photo left: M. Magnes, Photo right: M. Janišová.**

**Also a couple of *Euthystira brachyptera* enjoyed the nice view in the *Stipa styriaca* habitat Photo: M. Magnes (det. P.K.).**

**Quo vadis *Stipa styriaca*? Photo: M. Janišová.**

After lunch we divided into two groups: one half followed Peter, who had managed to clear an overgrown grassland on acidic bedrock near Neumarkt in der Steiermark, while the other group visited the rocky grassland near the rock fortress at the Puxerloch. Luckily all the group sampling near Puxerloch returned safely to the hotel, although there were some difficulties staying in place on such a steep slope. Back in our hotel we had delicious dinner accompanied by traditional music.
Then there was a scientific session: Ermin spoke about the vegetation of Bosnia and Amparo showed us a wonderful presentation about the landscape and plant and animal diversity in the Picos de Europa National Park (Cantabrian Range, northern Spain).

**Dark-eyed beauty in Oberkurzheim (Murbodner). Photo: E. Mašić.**

**Recently cleared grassland patch in Neumarkt. Photo: R. Guarino.**

**Really steep rocky grassland patch at the Puxerloch. Photo: M. Janišová.**

**8 July – East Tyrol: Virgen**
This day we went to East Tyrol. We had a short coffee break near the north shore of the Wörther See. We enjoyed a wonderful view of the mountain lake and continued driving along the Drau Valley up to Lienz, the capital of East Tyrol. From here we followed the Isel Valley, in Matrei in Osttirol we followed the right tributary, the Virgen Valley to the village Virgen and checked in at the Pension Waldruhe. After lunch we organised a sampling session on a very steep hay meadow owned by our host family. After dinner we used the hay barn for identification and pressing our plants. When the moon came out, we enjoyed a wonderful opera performance by Riccardo.

**The Wörther See with the famous summer-green from the North, in the background the Karawanken. Photo: M. Janišová.**

**Lunch in Virgen. Photo: J. Dengler.**

**The meadow of our host family in Marin. Photo: J. Dengler.**



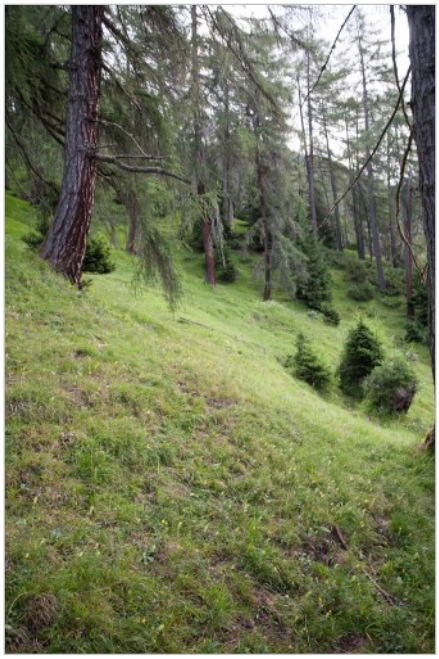
**Meadow in Marin, *Onobrychis arenaria* subsp. *taurerica*, *Briza media*. Photos: M. Magnes.**


**Despite the thunderstorm our enthusiastic group started to sample another plot shortly before dinner. Photo: M. Janišová.**


**What place could be more appropriate to dry the plants than a hay barn? Photo: M. Janišová.**

**The young tenor from Palermo received a big applause. Photo: J. Dengler.**

**9 July – East Tyrol: Virgen Valley, Zinizachspitze, Obermauern**
The next day we started early in the morning and walked to the former subalpine hay meadow owned by our host family. This meadow is located on the south-eastern slope of the Zinizachspitze, in the so called "Firschnitz". We passed the Allerheiligen-Chapel, built in the 8th century on a rock in the traditionally grazed larch forest.
Just below the current timberline at about 2,000 m a.s.l. we started the sampling in an avalanche corridor that was used as a meadow up to the last years. The weather was wonderful, the views were very beautiful and the grasslands were colorful with flowers and lots of marvelous butterflies.



**The Allerheiligen Chapel from the 8th century, on the way from Marin to the Zinizachspitze, traditionally pastured larch forests in the subalpine belt. Photos: M. Janišová (left), J. Dengler (right).**

**What is causing the tumult in the larch forests? Oh, it is the orchid (*Nigritella rhellicani*). Photos: J. Dengler (left), M. Magnes (right).**

**The richness record owner of the 11th EDGG Field Workshop. Photos: J. Dengler (left), M. Janišová (right).**

**Working on the steep slopes. Photos: J. Dengler (left), M. Magnes (right).**

***Astragalus penduliflorus, Pedicularis elongata*. Photos: J. Dengler.**

**The Gottschaunalm, in the background the Rötspitze with the Welitzkees. Photo: R. Guarino.**

**Lunch at the Gottschaunalm. Although most of us followed the wise alpine advice- "never finish a meal without a distillate" - most participants felt a little bit sick in the upcoming days. Photos: R. Guarino (left), M. Janišová (right).**

On the way back to our pension, we had a fine view on our last target of the day, the so called "Burg" Obermauern, a rock outcrop covered partly with moraine sediments.

**Obermauern with the pilgrimage church Maria Schnee, in the center the "Burg" Obermauern, steep south eastern faced rocky grassland on the "Burg". Photos: M. Magnes (left), J. Dengler (right).**

**10 July –Upper Inn Valley: Tyrol, Kauns**

After breakfast we left the Pension Waldruhe in our two brave microbuses and we made a short stop at the pilgrimage church Maria Schnee in Obermauern to see the famous fresco paintings of the Passion of Jesus from the 15th century. We went back to Matrei and crossed the Hohen Tauern through the Felber Tauern Tunnel, passing one of the big longitudinal valleys of the Eastern Alps, the Salzach Valley in Mittersill and then the Kitzbühler Schiefer Alpen by the Pass Thurn and made a short break west of Kitzbühel. Then we followed the Brixen Valley to Wörgl, where we reached the Inn Valley. Unexpectedly without any traffic jam, we could ascend the Inn Valley on the highway, passed Innsbruck and made a stop at the service area near Mills. Then we went further to Landeck, where we left the highway and made a lunch stop in the dry grassland area of Fließ. Later we went further to our next pension, the Gasthof Falkeis, where we met Philipp Kirschner. After the check-in we started with our work in the dry grasslands near Kauns, in areas that are now, after some decades of abandonment, grazed by goats again. The grazing is managed by the Naturpark Kaunergrat and this monitoring program can show already some encouraging results. In the evening we got an introduction to the managing programs of the Naturpark Kaunergrat by Ernst Partl and Philipp Kirschner.

**Still lots of space in the luggage compartment; the famous fresco paintings in the Maria Schnee church. Photos: A. Mora (left), M. Janišová (right).**

**Kauner dry grasslands managed by goats, castle Laudegg from the Kaunerberg. Photos: J. Dengler (left), M. Magnes (right).**

**11 July – Upper Inn Valley: Tyrol, Fließ**

In the morning we went to adjacent Fließ, a village on a plateau ("Oberes Gericht") approximately 200 m above the Inn Valley. We started in the western part, on steep slopes that are partly pastured by the Tyrolean Gray Cattle. Then we visited the Archeological museum of Fließ. Riccardo did not only translate the very interesting remarks of our guide to English but also added different aspects from his own historical wealth of experience. It is a small but excellent museum, with lots of artefacts that proof settlements from the early Bronze and Iron Age.

**Tyrolean Gray Cattle on the steep pastures of Fließ. Photo: M. Magnes.**

**Universal scholar Riccardo translating with improvements in the Archaeological Museum of Fließ; axe from the Iron Age with an interestingly cut handle (Archaelogical Museum of Fließ). Photos: J. Dengler (left), M. Janišová (right).**

**A pasture south east from the village Fließ. Time to think on some kind of recreation. Photos: M. Janišová (left), M. Magnes (right).**

**On dry and hot stones it´s fine to have a hairy hood (*Syntrichia ruralis, Sempervivum arachnoideum*); is the role as pollinators of butterflies (*Melitaea trivia*) overestimated? Photos: M. Magnes (left), A. Mora (right).**

**The very steep dry grasslands of the castle hill of Laudegg. Photo: J. Dengler.**

**12 July –Upper Inn Valley: Tyrol, Ladis – Carinthia: Gösselsdorfer See**

After breakfast Monika and Wolfgang left, and Philipp went with Riccardo, Denys and Harald to a subalpine hay meadow above Kauns, while other participants worked either with Helmut on the grasslands of Fließ again or moved to the castle hill of Laudegg. Around noon we met at the service station in Mills where we said goodbye to Philipp. We went back the Inn Valley, took the Pass Thurn and the Felber Tauern tunnel and made a break in Lienz. We reached our last accommodation, the Sablatnighof between the Turner and the Gösselsdorfer See in South Carinthia at about 18.30. After a nice and typical dinner, some of us enjoyed an evening swimming in the remarkable warm Gösselsdorfer See. Then we finished the day with a closing meeting to organize work post expedition.

**The last working evening. Photos: J. Dengler.**

**13 July – Carinthia, Griffen – Graz**

After breakfast, Helmut started with all the males and Milica immediately to Graz, while Martin with the rest of the girls went to Griffen, to make the last normal plot on the castle hill, a place that was studied also by Braun-Blanquet. After the day of hard work, we were rewarded by fine drinks at the small restaurant at the top of the castle hill.

Then we successfully returned to Graz and wished each other a happy journey.

Thus the 11th EDGG Field Workshop has finished.

**Working hard at the castle hill of Griffen and the reward. Photos: M. Magnes.**

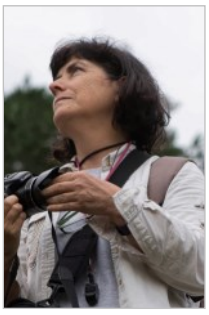
# HELLO! HALLO! ZDRAVO! HI! HOLA! KAIXO! PRIVET! PRYVIT! CIAO! AHOJ!
# The organisers and participants

Photos by Jürgen Dengler, Monika Janišová, Laura Cancellieri, Ermin Masic, Riccardo Guarino & Elena Belonovskaya

Anna Kuzemko

Wolfgang Willner

Asun Berastegi



Itziar García-Mijangos

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Denys Vynokurov

Iwona Dembicz

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Milica Stanišić

Ermin Mašić

Idoia Biurrun

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Monika Janišová

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# On the trails of Josias Braun-Blanquet II: First results from the 12th EDGG Field Workshop studying the dry grasslands of the inneralpine dry valleys of Switzerland

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**Abstract**

The 12th EDGG Field Workshop took place from 11 to 19 May 2019, organised by the Vegetation Ecology Group of the Institute of Natural Resource Sciences (IUNR) of the Zurich University of Applied Sciences (ZHAW). Like in the 11th Field Workshop in Austria, the main target was the "Inneralpine Trockenvegetation" (*Festuco-Brometea* and *Sedo-Scleranthetea*), which was first extensively sampled by Josias Braun-Blanquet and collaborators during the 1950s. We visited the Rhône valley in the cantons of Vaud and Valais, one of the most extreme xerothermic islands of the Alps and the Rhine and Inn valleys in the canton of Grison. In total, 30 nested-plot series (EDGG biodiversity plots) of 0.0001 to 100 m² and 82 plots of 10 m² were sampled in meso-xeric, xeric and rocky grasslands of 25 different sites, ranging from 500 to 1,656 m a.s.l., under different topographic, bedrock and landuse conditions. All vascular plants, bryophytes and lichens were recorded in each plot, along with their cover values. We found on average 28.9 vascular plants on 10 m²; which was the lowest mean species richness of any previous EDGG Field Workshop. These values are comparable to the average species richness values of dry grasslands of the Aosta valley in Italy. The data sampled will be used to understand the biodiversity patterns regionally and in the Palaearctic context as well as to place the Swiss dry grasslands in the modern European syntaxonomic system.

**Keywords**: biodiversity; bryophyte; dry grassland; Eurasian Dry Grassland Group (EDGG); *Festuco-Brometea*; inneralpine dry valley; lichen; nested plot; *Sedo-Scleranthetea*; species richness; syntaxonomy; vascular plant.

**Nomenclature**: Juillerat et al. (2017) for vascular plants; Meier et al. (2013) for bryophytes; Nimis et al. (2018) for lichens; Mucina et al. (2016) for syntaxa if no author citation is given.

**Abbreviations:** EDGG = Eurasian Dry Grassland Group; TWW = *Trockenwiesen und -weiden* (dry meadows and pastures).

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## Introduction

Field Workshops (formerly called Research Expeditions) are a major element of the annual activities of the Eurasian Dry Grassland Group (EDGG) (see Vrahnakis et al. 2013). Since the initial expedition to the dry grasslands of Transylvania, Romania (Dengler et al. 2012), the EDGG Field Workshop has sampled high-quality phytodiversity data of grasslands in different regions throughout the Palaearctic biogeographic realm (Dengler et al. 2016a, 2018b; Biurrun et al. 2019), using a standardised methodology (Dengler et al. 2016b). The 12th EDGG Field Workshop was organised in Switzerland from 11–19 May 2019 by the Vegetation Ecology Group of the Institute of Natural Resource Sciences (IUNR) of the Zurich University of Applied Sciences (ZHAW) (Dengler et al. 2019a). This Field Workshop can be considered the ideal continuation of the 11th Field Workshop, which took place from 6–13 July 2018 (see Magnes et al. 2020). Both initiatives aimed at revisiting the grassland sites sampled by Josias Braun-Blanquet and collaborators during the 1950s, prior to the preparation of his renowned monograph on the "Inneralpine Trockenvegetation" (Braun-Blanquet 1961). The 12th Field Workshop visited the continuation of the Tyrolian Inn valley in Switzerland (Lower Engadine), the valleys of Central Grisons (Rhine and tributaries) and the Rhône valley (cantons of Valais and Vaudt), one of the most extreme xerothermic islands of the Alps (Braun-Blanquet 1961).

Because of their continental climate, the inneralpine dry valleys in general host plant communities which are otherwise absent or rarely found in the Alpine Region. Many species typical of the steppic continental vegetation of Central and Eastern Europe have their most western, isolated outpost of their distribution range in the inneralpine dry valleys. The occurrence of these isolated outposts is due to the lower elevations of these inneralpine valleys, which makes them climatic islands, whose environmental conditions are very dissimilar to the more oceanic lower parts of the respective river valleys as well as the higher elevational zones of the Alps. The colonization routes were mostly driven by the Pleistocene climatic fluctuations. The long-lasting isola-

**Fig. 1. The Field Workshop team on 14 May 2019, having lunch break in the dry grasslands below Erschmatt, just above the deep gorge of the Feschilju stream near the Medieval "Ho Briggu" (High Bridge). From left to right: last row: Chiara Catalano, Manuel Babbi, second row: Iwona Dembicz, Riccardo Guarino, Wolfgang Willner, third row: Eline Staubli, Jamyra Gehler, Jonathan Pachlatko, fourth row: Sabrina Keller, Beata Cykowska-Marzencka, Jürgen Dengler, Denys Vynokurov, fifth row: Ivan Moysiyenko. Photo: D. Vynokurov.**

**Visp (Rhône valley), 639 m a.s.l.**
**(MAT: 9.4 °C, Precip.: 596 mm)**

**Chur (Rhine valley), 556 m a.s.l.**
**(MAT: 10.0 °C, Precip.: 849 mm)**

**Scuol (Inn valley), 1,304 m a.s.l.**
**(MAT: 5.5 °C, Precip.: 706 mm)**

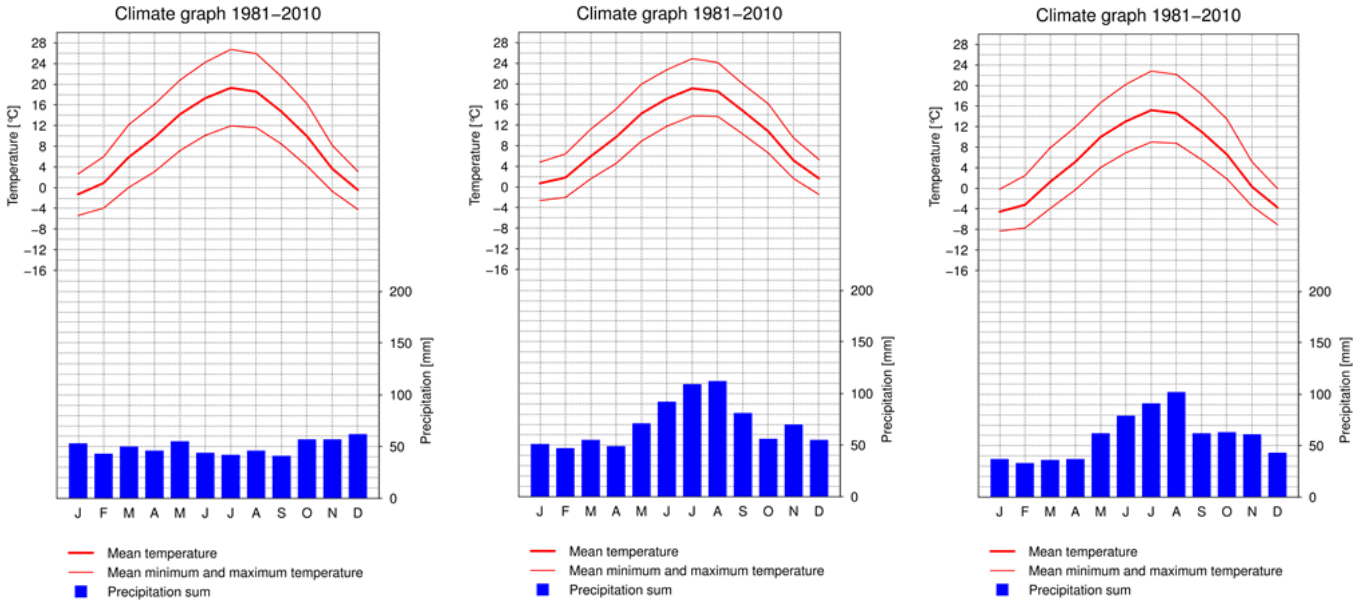


**Fig. 2. Climate diagrams of stations in the three studied inneralpine catchments from west to east. MAT = mean annual temperature, Precip. = annual precipitation. Diagrams kindly provided by https://www.meteoschweiz.admin.ch/home/klima/schweizer-klima-im-detail/klima-normwerte/klimadiagramme-und-normwerte-pro-station.html.**

tion of the inneralpine relict populations of many species makes them a priority target for the conservation of the European biodiversity. Despite their well-known floristic uniqueness, literature on the vegetation in inneralpine dry valleys in Switzerland is scarce, mostly old and mainly focussed on vegetation classification and the floristic and ecological characterization of the occurring vegetation types (Christ 1879; Frey 1934; Braun-Blanquet 1961), while only few recent studies also analyse biodiversity patterns (Schwabe & Kratochwil 2004; Boch et al. 2019; Dengler 2019b).

Our Field Workshop dealt mainly with the vegetation ascribed to the phytosociological class *Festuco-Brometea* (xeric, meso-xeric, and rocky grasslands), but also included some stands of rocky outcrops (*Sedo-Scleranthetea*). Here we would like to report from the Field Workshop and present some first, preliminary results on species composition (including findings of rare and specialised species), phytodiversity and syntaxonomic position.

## The 12th EDGG Field Workshop

The Field Workshop was attended by 16 people, including the organisers, from six European countries (Austria, Germany, Italy, Poland, Switzerland and Ukraine) (Fig. 1). Since several colleagues participated only partially, there were on average 10.75 people present per day.

Our itinerary was a round-trip starting and ending in Wädenswil at Lake Zurich and exploring the Swiss inneralpine valleys from the west to the east (Dengler et al. 2019a). We first sampled the lowest elevations in the Rhône valley and visited the nearly 1000 m higher located sites of the Inn valley (Lower Engadine) at the end, which was important as the phenology in general was quite late in 2019. On the way, we had four different accommodations, most of them for several nights, which allowed us to work effectively also in the evening.

Overall our sampled plots ranged from 46.1219° to 46.9828° northern latitude and from 6.9812° to 10.3765° eastern longitude and extended over more than 1000 m of elevation (500–1,656 m a.s.l.). Bedrocks were very diverse, limestone, granite, metamorphic rocks (gneiss, amphibolite), flysh, moraine and alluvial deposits, while base-rich substrata overall prevailed. In terms of climate, the Rhône valley is the driest and most continental, followed by the Inn valley, while the Rhine valley is the least continental with the highest precipitation (Fig. 2). Regarding our sampling points, annual precipitation varied considerably from as low as 461 mm to more than 1,200 mm (Table 1). It is not surprising that also the mean annual temperature showed a broad range (from 3.2 °C to nearly 11 °C), due to the big differences in elevation, while the three other variables referring to temperature variability hardly did (Table 1).

**Table 1. Modelled climatic variables from the locations of the plots, based on the CHELSA database (Karger et al. 2017).**

| Variable | Min | Max | Mean |
|---|---|---|---|
| Annual mean temperature (Bio1) [°C] | 3.2 | 10.8 | 7.9 |
| Mean diurnal range of temperature (Bio2) [K] | 7.9 | 8.1 | 8.0 |
| Temperature seasonality (Bio4) [K] | 6.55 | 6.80 | 6.70 |
| Temperature annual range (Bio7) [K] | 26.9 | 27.8 | 27.4 |
| Annual precipitation (Bio12) [mm] | 461 | 1,221 | 634 |

We distributed our plots across the three inneralpine valley systems of Switzerland, Rhône, Rhine and Inn, with the aim to capture the full gradient of geographical and ecological differentiation among the occurring *Festuco-Brometea* and *Sedo-Scleranthetea* communities (Figs. 3 and 4). The sites were selected to cover the geographic gradient of the three valley systems as comprehensively and evenly distributed across space as possible within the restricted time. When organising the Field Workshop, we made a pre-selection of suitable sites, mainly based on the online available polygons of protected dry grasslands of national importance (TWW objects; see https://map.geo.admin.ch: TWW and TWW, Anhang 2), which in general present the best preserved and largest dry grassland habitats of the country. This selection was on the one hand sub-setted, on the other complemented with non-protected but interesting sites, mainly based on prior field knowledge of S. Boch, J. Dengler and S. Eggenberg. We excluded only three places where we had enough plot data from other occasions (Ausserberg in the Rhône valley, Sumvitg and Chur in the Rhine valley system). From this initial, larger list of potential sites, we finally sampled those that were possible within the restricted time frame, giving priority to particularly diverse and easily accessible sites. Within the sites, we tried to spread our plots in space and to capture the existing diversity of ecologically and physiognomically different dry grassland types (e.g. meso-xeric vs. xeric, north-facing vs. south-facing slopes). Where rocky outcrop communities (*Sedo-Scleranthetea*) occurred in patches of 10 m² or larger, we specifically included them in our sampling.

In total, we sampled 30 nested-plot series ("EDGG biodiversity plots"; Fig. 5) with grain sizes of 0.0001–100 m² and 82 additional 10-m² plots ("normal plots" in EDGG terminology: Dengler et al. 2016b), resulting in 142 10-m² plots in total when also counting the 10-m² subplots from the nested-plot series (Table 2). We sampled 88 10-m² plots in the Rhône catchment, 18 in the Rhine catchment and 36 in the Inn

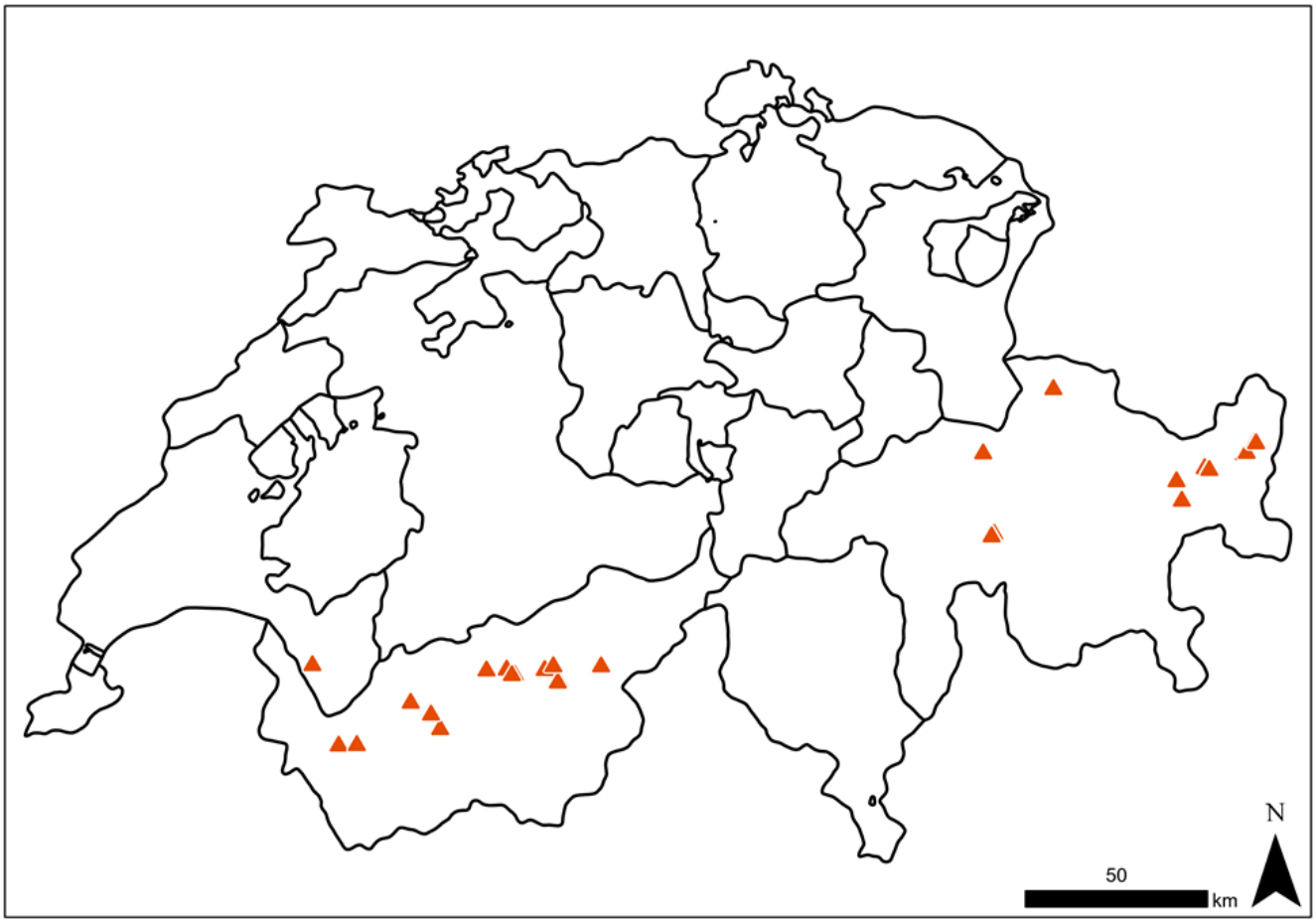


**Fig. 3. Distribution of the sampling sites of the 12th EDGG Field Workshop in three cantons of Switzerland. From West to East: Vaud, Valais and Grisons. Map by M. Babbi, copyright geodata: swisstopo DV084370.**

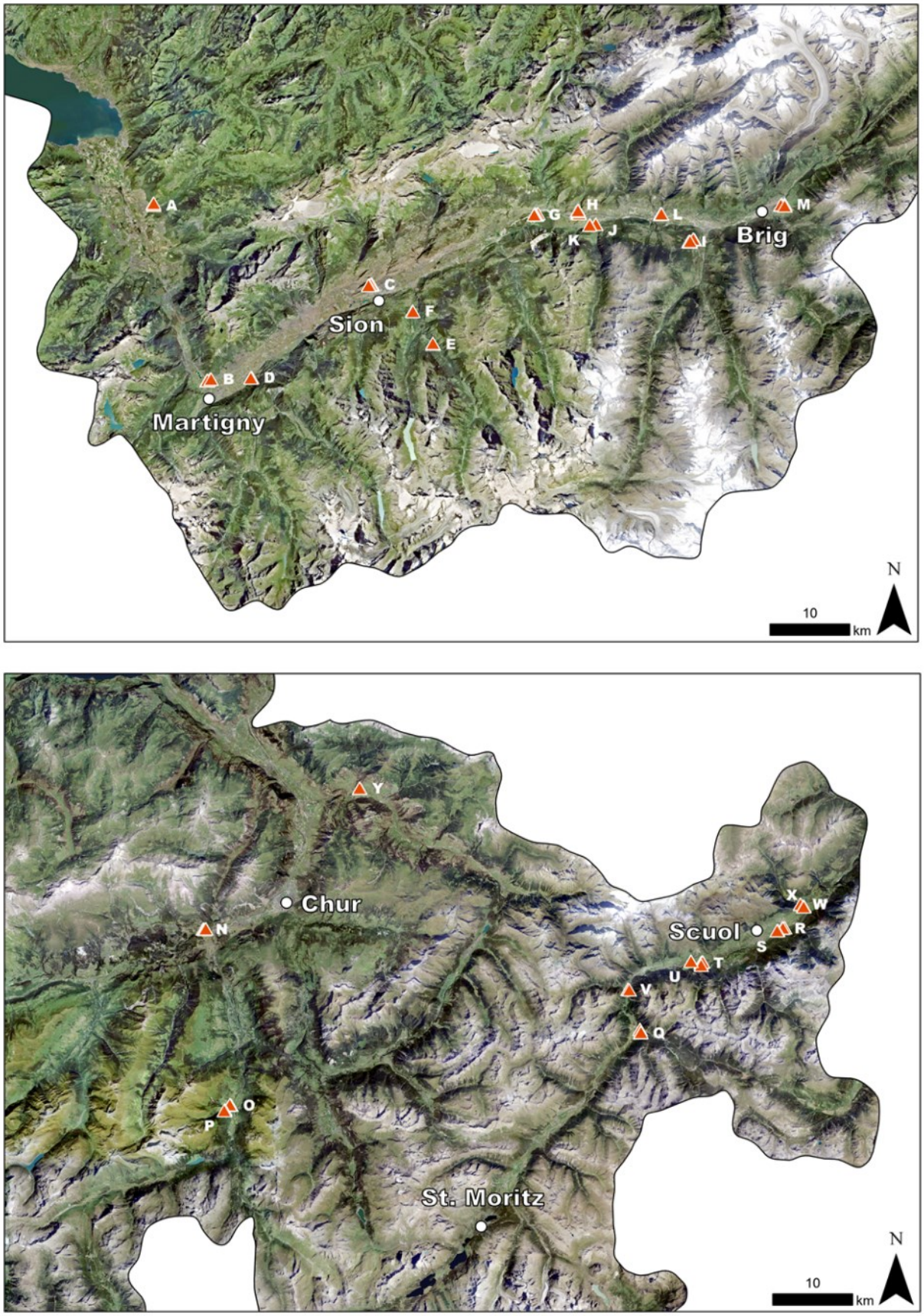


**Fig. 4. Sampling sites in the catchments of the Rhône river (upper map: cantons of Vaud and Valais) and those of the Rhine and Inn river (lover map: canton of Grisons), sampled during the first and second part of the Field Workshop, respectively. The background is a full-colour orthophoto, allowing the river systems and different land covers, such as grasslands, forests and barren areas to be distinguished. The letters refer to the site IDs of Table 2 and have been assigned chronologically. Maps by M. Babbi, copyright geodata: swisstopo DV084370.**

**Fig. 5. Sampling of an EDGG biodiversity plot in the TWW object No. 7003 (Suen-Trogne) in the canton of Valais. Photo: J. Dengler.**

catchment. During the seven full and two half days, we studied 25 different sites, with between two and 15 10-m² plots each. In 80% of all sites we made at least one biodiversity plot, while in all but one site we also had additional normal plots. Compared to the previous 11 Field Workshops, we sampled particularly numerous plots, despite a longer survey time for most of them. Only during the 6th (Russia-Khakassia: 39), the 7th (Spain: Navarre: 35), the 9th (Serbia: 32) and the 8th Field Workshops (S Poland: 31) more nested plot series were sampled and only during the 2nd Field Workshop (Ukraine: Podolia: 226) more 10-m² plots were collected (Aćić et al. 2017; unpubl. data from GrassPlot, see Dengler et al. 2018b).

## Initial results and discussion

### *Floristic composition and species of special interest*

The most frequent vascular plants (based on the 142 10-m² plots) were *Bromus erectus* (80%), *Potentilla pusilla* (68%), *Artemisia campestris* (51%), *Helianthemum nummularium* subsp. *obscurum* (45%), *Euphorbia cyparissias* (43%), *Carex caryophyllea* (41%) and *Arenaria serpyllifolia* (40%). Some typical species for the different types of dry grasslands are shown in Fig. 6.

Among other grasses, particularly species of the genera *Festuca*, *Stipa*, *Koeleria* and *Poa* are typical, frequent and often dominant in the investigated grasslands, but they contain some "critical" microtaxa. From the *F. ovina* aggr. s.l. (= *F. ovina* aggr. + *F. valesiaca* aggr. sensu Juillerat et al. 2017), the most frequent species was *Festuca valesiaca*, which in most cases could safely be determined in the field (approx. 40% of all 10-m² plots). The identification of the remaining samples is ongoing, but we can already provide a rough picture. Less frequent, but still quite common (ca. 20% of the plots) were *F. rupicola* and *F. laevigata*, while *F. guestfalica* was rarer (ca. 10%). Besides, in the canton of Valais we confirmed *F. pallens* in rocky dry grasslands (see also Dengler et al. 2019b), while in the Lower Engadine, we regularly sampled specimens that likely belong to *F. bauzanina* subsp. *rhaetica*, which was reported from this region before by Arndt (2008), but has not been included to the Swiss checklist of vascular plants (Juillerat et al. 2017) yet. However, the latter needs caryological confirmation as the morphological discrimination against *F. rupicola* and *F. brevipila* is tricky due to significant overlaps in the morphological traits of these related taxa of different ploidy levels. The genus *Stipa* was represented in our plots by three species – most common was *S. eriocaulis* (24%) and less frequently *S. pennata* (12%) and *S. capillata* (9%) occurred. The genus *Koeleria* was also represented by three species: the most common was *K. vallesiana* (29%), slightly less frequent was *K. macrantha* (22%), whilst *K. pyramidata* occurred only in three plots (including two corners of one biodiversity plot). From the genus *Poa*, the most frequent species was *P. bulb-*

**Table 2. Overview of the dry-grassland sites studied during the 12th EDGG Field Workshop 2019. Most sites belong to the protected dry grasslands of national importance (TWW objects). In this case the object ID and name are indicated.**

| Site ID | Day | Valley (catchment) | Canton | Municipality | Name of the site | # Biodiversity plots | # Normal plots | Total # 10-m² |
|---|---|---|---|---|---|---|---|---|
| A | 11 May | Rhône | Vaud | Aigle, Ley- | TWW object No.6210 (Drapel) | - | 3 | 3 |
| B | 12 May | Rhône | Valais | Dorénaz, Fully | TWW object No. 7550 (Les Follatères) | 3 | 9 | 15 |
| C | 13 May | Rhône | Valais | Vex | TWW object No. 7150 (Mont d'Orge) | 3 | 5 | 11 |
| D | 13 May | Rhône | Valais | Charrat | TWW object No. 7588 (Charrat | 1 | 2 | 4 |
| E | 13 May | Borgne | Valais | Saint- | TWW object No. 7003 (Suen- | 1 | 2 | 4 |
| F | 13 May | Borgne (Rhône) | Valais | Vex | Near TWW object No. 7158 (Les Bioleys) | - | 2 | 2 |
| G | 14 May | Rhône | Valais | Leuk | Regional Nature Park Pfyn-Finges: alluvial steppe near Tur- | 2 | 4 | 8 |
| H | 14 May | Rhône | Valais | Leuk | TWW object No. 7211 (Ober | 2 | 9 | 13 |
| I | 15 May | Rhône | Valais | Zeneggen | TWW object No. 7078 (Alt Ze-neggen) | 2 | 6 | 10 |
| J | 15 May | Rhône | Valais | Turtmann-Unterems | TWW object No. 7071 (Chrizhubel) | 1 | 1 | 3 |
| K | 15 May | Rhône | Valais | Turtmann- | Chastlärä | - | 3 | 3 |
| L | 15 May | Rhône | Valais | Raron | TWW object No. 7063 (Heidnischbiel) | 1 | 3 | 5 |
| M | 16 May | Rhône | Valais | Ried-Brig | TWW object No. 7124 (Biela) | 2 | 3 | 7 |
| N | 16 May | Rhine Anterior | Grisons | Tamins | TWW object No. 8157 (Fatschis) | 1 | 3 | 5 |
| O | 17 May | Rhine Posterior | Grisons | Donat | TWW object No. 9883 (Bot Git) | 2 | 1 | 5 |
| P | 17 May | Rhine Posterior | Grisons | Casti-Wergen- | TWW object No. 9890 (Casti) | - | 4 | 4 |
| Q | 17 May | Spöl (Inn) | Grisons | Zernez | TWW object No. 9817 (Muottas) | 2 | 2 | 6 |
| R | 18 May | Inn | Grisons | Scuol | TWW object No. 9133 (Marièrs) | 1 | 3 | 5 |
| S | 18 May | Inn | Grisons | Scuol | TWW object No. 9181 (Suronnas) | 1 | 2 | 4 |
| T | 18 May | Inn | Grisons | Scuol | TWW object No. 9768 (Chastè | 1 | 8 | 10 |
| U | 18 May | Inn | Grisons | Scuol | TWW object No. 9787 (Flanoua) | 1 | - | 2 |
| V | 18 May | Inn | Grisons | Zernez | TWW object No. 9811 (Chaschinas) | - | 2 | 2 |
| W | 19 May | Inn | Grisons | Valsot | TWW object No. 9108 (Chantata) | 1 | 1 | 3 |
| X | 19 May | Inn | Grisons | Valsot | TWW object No. 9735 (Ruina | 1 | 2 | 4 |
| Y | 19 May | Landquart (Rhine) | Grisons | Grüsch | TWW object No. 8840 (Munts) | 1 | 2 | 4 |

**Fig. 6. A selection of characteristic vascular plant species of the Swiss inneralpine dry valleys. From upper left to lower right: *Trifolium montanum*, typical for meso-xeric grasslands, *Pulsatilla montana*, typical for xeric grasslands, *Scorzonera austriaca*, typical for rocky grasslands, *Sempervivum arachnoideum*, typical for rocky outcrop communities. Photos: J. Dengler.**

*osa* (30%), followed by *P. angustifolia* (27%), while also *P. perconcinna* (10%) and *P. badensis* (9%) regularly occurred, but *P. alpina*, *P. chaixii*, *P. compressa* and *P. pratensis* were rare.

Interestingly, and in contrast to the distribution patterns reported in Lauber et al. (2018) we only found *Brachypodium rupestre* from the *Brachypodium pinnatum* aggregate, never *Brachypodium pinnatum* s.str. Likewise, we only found *Potentilla pusilla* (68%), but never *Potentilla verna*, and only very rarely *Potentilla cinerea* (1%). This indicates that many botanists did not and still do not distinguish these microspecies and erroneously record *Brachypodium pinnatum* for *Brachypodium pinnatum* aggr. and *Potentilla verna* for *Potentilla verna* aggr. Based on our experience, records of *Brachypodium pinnatum* s.str. and *Potentilla verna* s.str. from the inneralpine dry valleys of Switzerland should be critically revised. These clear patterns of vicariance might also have syntaxonomic implications (see below).

The most frequent bryophyte species (based on 69 normal plots) were *Abietinella abietina* (36%), *Syntrichia ruralis* (29%), *Bryum caespiticium* (26%), *Weissia brachycarpa* (26%), *Phascum cuspidatum* (23%) and *Bryum argenteum* (20%) (see Fig. 7). In the investigated dry grasslands 61 moss taxa were noted. Among them ground mosses of the *Pottiaceae* family predominated (e.g. *Barbula unguiculata*, *Didymodon rigidulus*, *Syntrichia ruralis*, *S. intermedia*, *Phascum cuspidatum*, *Weissia brachycarpa* and *W. longifolia*). They are perfectly adapted to high temperatures and high sunlight due to their papillary leaves. Common mosses like *Bryum argenteum*, *Ceratodon conicus* and *C. purpureus* also frequently occurred on bare ground and plant debris. On basic sites, typical mosses of base-rich grasslands were found: *Abietinella abietina*, *Campyliadelphus chrysophyllus*, *Encalypta vulgaris*, *Homalothecium lutescens*, *Rhytidium rugosum*, *Tortella tortuosa* and *Timmia norvegica.* On rocky ground (gravel, stones, sometimes margins of rocks) *Grimmia laevigata*, *G. pulvinata*, *Hedwigia ciliata*, *Orthotrichum anomalum*, *Schistidium apocarpum* and *S. atrofuscum* were noted. During our study, liverworts were much less frequently recorded than mosses: we found in total only eight species; among them the most common were *Athalamia hyalina*, *Riccia glauca*, *Cephaloziella divaricata* and *Porella platyphylla.*

The most frequent lichen species (based on the 142 10-m² plots) were *Cladonia pocillum* (14%), *C. symphycarpia* (13%), *Placidium squamulosum* (11%) and *Toninia sedifolia* (10%),

**Fig. 7. A selection of characteristic non-vascular species of the Swiss inneralpine dry valleys. Upper row left: the liverwort *Targionia hypophylla*, right: the moss *Rhytidium rugosum*, lower row left: *Diploschistes muscorum* and *Squamarina lentigera,* right: *Cladonia* sp., *Fulgensia* cf. *bracteata, Squamarina lentigera, Toninia sedifolia*. Photos: J. Dengler.**

indicating mostly calcareous or at least base-rich soil conditions (see Fig. 7). In general, lichens in grasslands need open conditions with little competition, providing suitable microhabitats within the scattered vegetation (Boch et al. 2016). Regarding the distribution patterns across Switzerland, we found several species which specialise on the dry, warm and sunny conditions of the investigated dry grasslands in the inneralpine dry valleys (Stofer et al. 2019). Among these, *Caloplaca raesaenenii*, *C. stillicidiorum* and *Candelariella aggregata* grow on dead plant material in steppe grasslands, such as the persistent leaf sheaths of *Koeleria vallesiana*, whereas *Enchylium coccophorum*, *Endocarpon pallidum*, *E. pusillum*, *Gyalidea asteriscus*, *Heppia adglutinata*, *Leptochidium albociliatum* and *Rinodina terrestris* grow directly on soil. All these species are small to very small and therefore likely frequently overlooked, probably explaining the rather few known localities in Switzerland.

***Phytodiversity***

Apart from three biodiversity plots in Dengler et al. (2019b), we now for the first time describe in detail the scale- and taxon-dependent plant diversity patterns in dry grasslands of the Swiss inneralpine valleys (Table 3) and thus allow comparisons with similar data from elsewhere in the Palaearctic (e.g. Dengler et al. 2016a). Mean vascular plant species richness increased from 2.0 species on 0.0001 m², via 17.5 on 1 m², 28.9 on 10 m², to 47.3 on 100 m². This is lower than the values found in any of the previous EDGG Field Workshop studying the dry grasslands of a region with the same method (except for 0.0001 m², where the values in Serbia and Sicily were slightly lower) (Dengler et al. 2016a; Aćić et al. 2017; Filibeck et al. 2018; Magnes et al. 2020). For example, for the 10-m² grain, the so far lowest regional average was from Serbia (30.9 species), while the highest mean values were 49.7 in Transylvania (Romania), 49.5 in the Apennines (Italy) and 41.9 in Navarre (Spain) (Dengler et al. 2016a; Aćić et al. 2017; Filibeck et al. 2018). Preliminary averages of *Festuco-Brometea* grasslands across the Palaearctic realm were also clearly higher across all scales than the values from the Swiss inneralpine valleys, with 2.3 on 0.0001 m², 21.0 on 1 m², 34.9 on 10 m² and 54.1 on 100 m² (Dengler et al. 2018a). Comparably "low" vascular plant species richness in dry grasslands was found so far only (outside EDGG Field Workshops) in the Aosta valley (an extreme inneralpine valley of NW Italy, running parallel to the Rhône valley in Valais: 27.8 species on 10 m²: Wiesner et al. 2015), while the values on the hemiboreal islands of Öland and Saaremaa (24.2 and 24.0) and in the Pleistocene lowlands of NE Germany (19.8) were even lower (see Dengler et al. 2016a). Compared to most other habitats in Switzerland, dry grasslands are still particularly species rich. Thus, it is challenging to understand why their richness is lower across all scales when compared to dry grasslands elsewhere in Europe. One explanation might be that the Swiss inneralpine valleys, like Aosta valley, the hemiboreal zone and NE Germany, were all covered by glaciers during the last glacial maximum, while all the other regions studied by EDGG Field Workshops were not. This glaciation could have impacted the regional species pool and this in turn the plot-scale richness. To solve this riddle in detail, however, will require a joint analysis of α-diversity patterns across the Palaearctic realm, which is currently in preparation with the GrassPlot data (I. Dembicz et al. in prep.). For non-vascular plants, the pattern is different. While the identification is not yet completely finalised and thus the richness data might slightly change, it is already clear that mean richness in the Swiss inneralpine valleys is at an intermediate level compared to other regions. With about 5.5 non-vascular species on 10 m², the stands were on average richer than in Transylvania (3.1) or Podolia (3.9), but poorer than in Sicily (7.0) or Navarre (6.5).

***Syntaxonomy***

Our field impressions confirmed that the *Festuco-Brometea* communities of the Swiss inneralpine dry valleys belong to three major groups: meso-xeric, xeric and rocky grasslands. We could confirm this pattern, which had been elaborated for Ausserberg, Valais, by Dengler et al. (2019b), throughout the study region. These three main types correspond to habitat types of the refined European EUNIS typology (Janssen et al. 2016; Schaminée et al. 2016), namely E1.2a – Semi-dry perennial calcareous grassland (meso-xeric), E1.2b – Continental dry steppe (xeric) and E1.1g – Perennial rocky grassland of Central Europe and the Carpathians (rocky). They also correspond to three phytosociological orders of the *Festuco-Brometea* that have been accepted in nearly all recent broad-scale studies of the class (e.g. Mucina et al. 2016; Willner et al. 2017, 2019): *Brachypodietalia pinnati* (meso-xeric), *Festucetalia valesiacae* (xeric) and *Stipo pulcherrimae-Festucetalia pallentis* (rocky). However, they con-

**Table 3. Preliminary species richness data from the 12th EDGG Field Workshop in Switzerland.**

| | | Total richness | | Vascular plants | | Bryophytes | | Lichens | |
|---|---|---|---|---|---|---|---|---|---|
| Area [m²] | *n* | Mean | Range | Mean | Range | Mean | Range | Mean | Range |
| 0.0001 | 60 | 2.3 | 0–5 | 2.0 | 0–5 | 0.2 | 0–2 | 0.1 | 0–1 |
| 0.001 | 60 | 3.6 | 0–8 | 3.0 | 0–8 | 0.4 | 0–3 | 0.1 | 0–3 |
| 0.01 | 60 | 6.2 | 0–14 | 5.2 | 0–11 | 0.8 | 0–4 | 0.3 | 0–6 |
| 0.1 | 60 | 12.0 | 5–24 | 10.1 | 3–20 | 1.4 | 0–5 | 0.5 | 0–7 |
| 1 | 60 | 20.7 | 10–33 | 17.5 | 5–30 | 2.1 | 0–7 | 1.1 | 0–8 |
| 10 | 142 | 34.4 | 9–60 | 28.9 | 7–49 | 3.3 | 0–12 | 2.2 | 0–23 |
| 100 | 30 | 58.3 | 29–84 | 47.3 | 17–69 | 6.2 | 0–16 | 4.6 | 0–25 |

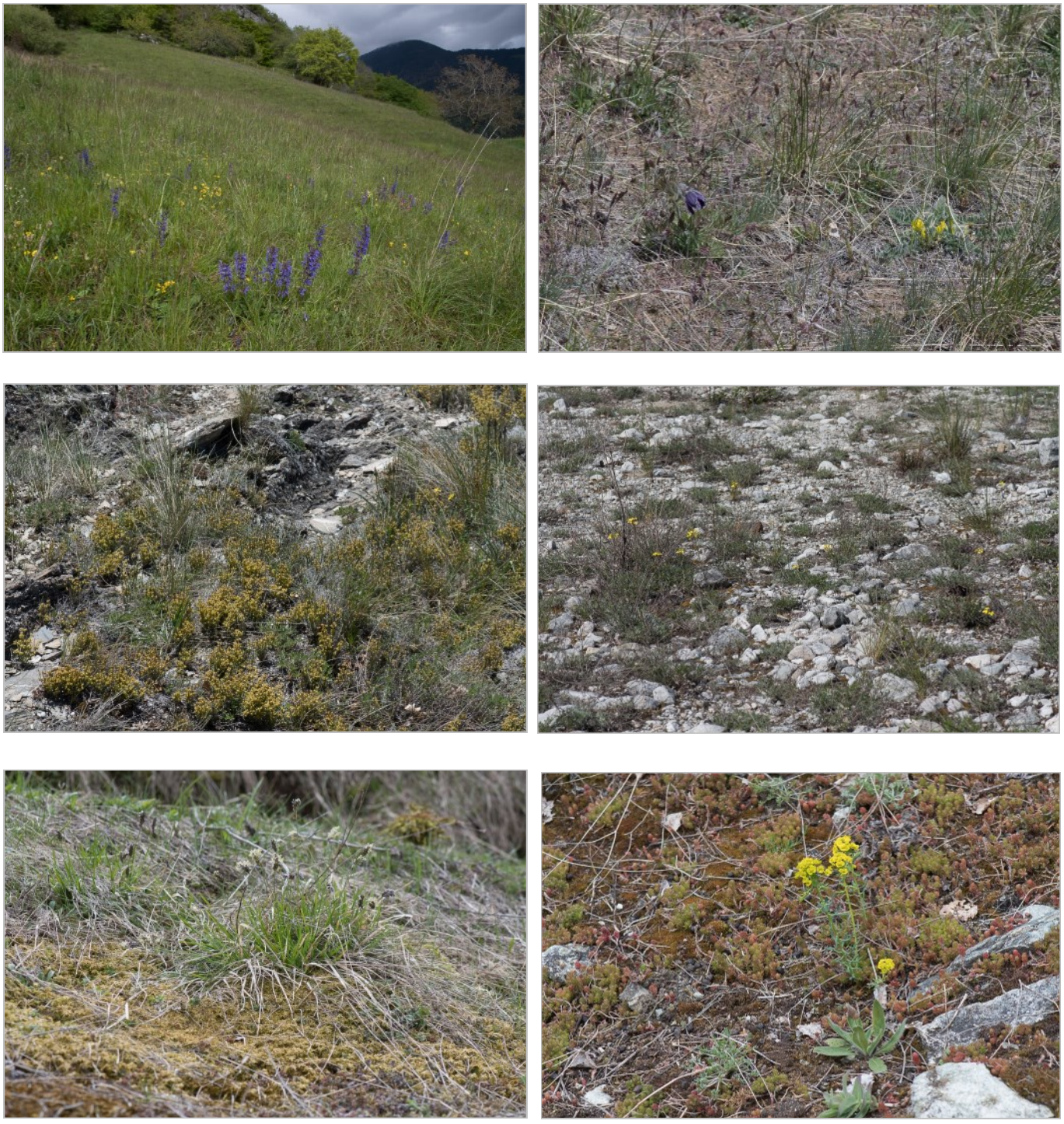

**Fig. 8. Examples of the main vegetation types studied. Upper row left: meso-xeric grassland with *Salvia pratensis*, Drapel, Valais, right: xeric grassland with *Pulsatilla montana* and *Astragalus exscapus*, Alt Zerneggen, Valais; middle row left: rocky grassland with *Ephedra helvetica* and *Stipa eriocaulis*, Mont d'Orge, Valais, right: special type of rocky grassland in the alluvial plain of the Rhône river with *Erysimum rhaeticum* and *Stipa eriocaulis*, near Turriljini, Valais; lower row left: dealpine *Sesleria caerulea* grassland with dense *Hylocomium splendens* carpet, Chastè Steinsberg, Grisons, right: rocky outcrop community with *Sedum sexangulare*, *S. maximum*, *Euphorbia cyparissias*, *Artemisia campestris* and *Echium vulgare*, Muottas, Grisons. For further information on the sites, see Table 2. Photos: J. Dengler.**

trast with the Swiss habitat typology in which the xeric and rocky types are merged into a single unit at alliance level ("*Stipo-Poion*"; Delarze et al. 2015). Following the typification of the *Stipo-Poion xerophilae* by Dengler et al. (2019b), this name would apply to the rocky grassland alliance, while the xeric, non-rocky grasslands of the Swiss inneralpine valleys seem to belong to the Eastern European *Festucion valesiacae*.

While the visual impression in the field supported the view that these three orders are present and well distinguished throughout the study region, there are major questions concerning their placement into alliances. Following the traditional and well-elaborated subdivision between the subatlantic *Bromion erecti* and the subcontinental *Cirsio-Brachypodion pinnati* (e.g. Willner et al. 2019), it was evident based on the species combination that the huge majority of the meso-xeric stands in the region should be placed in the *Cirsio-Brachypodion pinnati* and only for the stands in the more oceanic parts (lower Rhône valley in canton of Vaud, Rhine valley and tributaries) placement in the *Bromion erecti* would be plausible. However, our expedition also gave rise to another idea: a separate alliance of the meso-xeric grasslands of the inneralpine dry valleys and the dealpine gravel plains (e.g. in Southern Germany). This idea was prompted by the fact that all investigated stands differed from both the *Bromion erecti* and the *Cirsio-Brachypodion pinnati* (as defined e.g. by Willner et al. 2019) in the frequent presence of two species that are absent from both other alliances, *Brachypodium rupestre* and *Potentilla pusilla*. Moreover, these inneralpine meso-xeric grasslands harbor fewer species than the meso-xeric grasslands outside the Alps. It will be an interesting task to analyse whether it makes sense to delimit an additional inneralpine and dealpine alliance within the meso-xeric order *Brachypodietalia pinnati*.

We also found some *Sesleria caerulea* grasslands without other alpine species (see Fig. 8). Accordingly, they can hardly be placed in the class *Elyno-Seslerietea*. Therefore, one might consider placing them into the order *Stipo pulcherrimae-Festucetalia pallentis* (rocky grasslands), and within this possibly the alliance *Diantho lumnitzeri-Seslerion* (see Mucina et al. 2016).

Finally, the rocky outcrop communities of the class *Sedo-Scleranthetea* are also a challenge. Both Mucina et al. (2016) and Delarze et al. (2015) distinguish three alliances for the region: *Sedo albi-Veronicion dillenii* (acidophilous, lowlands), *Sedo-Scleranthion* (acidophilous, Alps) and *Alysso alyssoidis-Sedion* (basiphilous). While typical species of these alliances and the *Sedo-Scleranthetea* class often also occur as small-scale synusiae in xeric and rocky grasslands of the orders *Festucetalia valesiacae* and *Stipo pulcherrimae-Festucetalia pallentis*, they can indeed be found to form larger stands of 10 m² and more. However, from our field impressions it appears doubtful whether really three alliances can be distinguished as in the region the given diagnostic species often grow together. A detailed analysis of the data will be needed to solve this issue.

## Conclusions and outlook

We plan to finalise the identification of the remaining critical vascular plant, bryophyte and lichen species during the next few weeks. In parallel the soil samples will be analysed for some major parameters according to EDGG standards (Dengler et al. 2016b). Once these steps are completed, we intend to use our comprehensive dataset to prepare two publications, one on syntaxonomy of the studied dry grasslands and one on biodiversity patterns and their drivers. Where appropriate, we will include some additional plots sampled by J. Dengler and his team recently in the inneralpine dry valleys of Switzerland with similar methods, albeit not always with soil and cryptogam data. Additional "EDGG biodiversity plots" and 10-m$^2$ plots are available from Ausserberg, Valais (2018; published in Dengler et al. 2019b) as well as some more normal plots from Ausserberg, Valais (2019; CAS class: J. Dengler & M. Babbi); Chur, Grisons (2018; research project "Calanda Zielhang": M. Babbi, S. Widmer & J. Dengler) and Sumvitg-Cumpadials (2019; BSc class: J. Dengler).

As soon as the vegetation data are ready, they will also be integrated in the GrassPlot database (Dengler et al. 2018b; Biurrun et al. 2019) and the emerging Swiss national vegetation database ("Veg.CH") and via these in the European Vegetation Archive (EVA; Chytrý et al. 2016) and the global plot database "sPlot" (Bruelheide et al. 2019) to allow the best possible use. Moreover, the floristic information will be fed into the database of the National Data and Information Center on the Swiss Flora ("Info Flora"; https://www.infoflora.ch), bryophytes ("Swissbryophytes"; https://www.swissbryophytes.ch/) and lichens ("Swisslichens"; Stofer et al. 2019).

The notable value of the data from the Field Workshop is to provide the basis for implementing the pan-European dry grassland classification to Switzerland and to see whether based on proper data analysis our first impressions from the field are confirmed. The data can also lead to a refinement of the European classification that was hitherto lacking data from Switzerland. For example, it now can be tested where to draw the border between *Bromion erecti* and *Cirsio-Brachypodion* within the meso-xeric grasslands (*Brachypodietalia pinnati*) or whether even a new vicariant alliance could make sense. Further it could be tested whether the distinction of rocky (*Stipo-Poion xerophilae* s.str.) vs. xeric, non-rocky (*Festucion valesiacae*) grasslands as known from Eastern Central Europe and demonstrated for Ausserberg, Valais (Dengler et al. 2019b), should be applied throughout Switzerland. Also the numerous high-quality data of biodiversity in Swiss inneralpine dry grasslands are interesting as they show much lower richness across all scales for vascular plants, but relatively high richness for non-vascular plants compared to other regions in Europe.

These data will thus be a major input when developing models of patterns and drivers of scale- and taxon-dependent plant diversity of grasslands across the Palaearctic biogeographic realm (Dengler et al. 2018b, 2020).

## Author contributions

J.D. organised the Field Workshop with logistic support from J.G. As past and current EDGG Field Workshop Coordinators, J.D. and I.D. ensured the application of the EDGG standard methodology. All co-authors except S.B. helped with the field sampling. I.D. identified critical *Festuca* species, B.C.-M. identified bryophytes and S.B. identified lichens. J.D. drafted the report together with I.D. and R.G., M.B. prepared the maps, while R.G., I.M. and D.V. composed the photo diary. All authors checked, improved and approved the manuscript.

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# Appendix: Photo diary of the 12th EDGG Field Workshop

Edited by Riccardo Guarino, Ivan Moysiyenko & Denys Vynokurov
Photos by Beata Cykowska-Marzencka, Iwona Dembicz, Jürgen Dengler, Ivan Moysiyenko, Denys Vynokurov & Wolfgang Willner

Here, we present some photographs to remind you that the EDGG Field Workshops are more than just data collection. We are all the result of the experiences we have, of what we believe in and also of the people we meet. Each of us grows thanks to the people we walk with. Some remain, many follow different directions, many are about to be met. Each of them leaves us something, giving us a piece of our mosaic.

A piece of advice, a memory, a series of experiences, sometimes just a sentence, a smile or even... a plant identification! We are also made of this, of those who have shared with us a short stretch of the road.

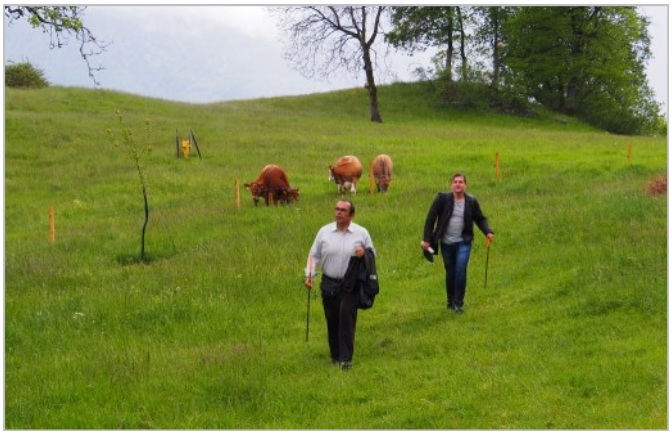
There are those who are connected to our life by something more than a common path, but with others, especially if we did a vegetation plot together, we have not lost our time.

**Day 1 (May 11, 2019)**

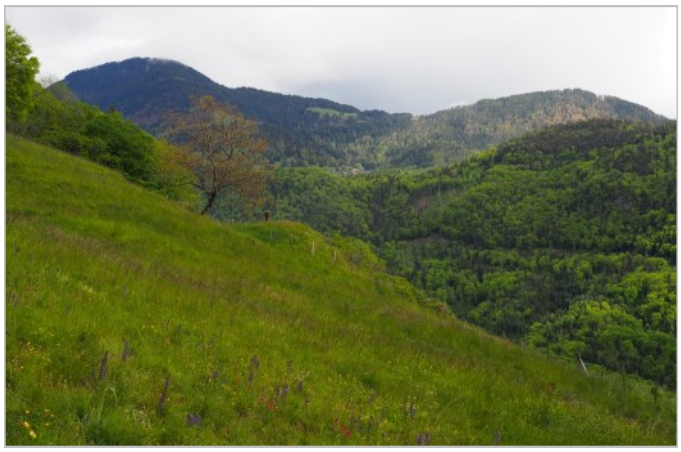
We met in Wädenswil in the Canton of Zurich, at the castle Schloss Wädenswil (the seat of the Vegetation Ecology Group, ZHAW Zurich University of Applied Sciences). In the early afternoon, we travelled to our first sampling locality, near Aigle village (Canton of Vaud), which is famous for its white wines. There we sampled *Bromus erectus* grasslands. In the evening, we stayed in the cosy youth hostel of Sion, the capital of the canton of Valais.

**Lunch at a gas station on the way to the Alps.**

**Alps greeted us with a rain.**




**Left: Sometimes we looked like shepherds - right: species-rich semi-dry grasslands in the vicinity of Aigle village.**

**Left: sampling process - right: typical landscape with dry grasslands and forests near the village of Aigle.**


**Left: The southern slopes are almost entirely covered with vineyards - right: stimulation of the identification process.**

**Day 2 (May 12, 2019)**
Our second sampling site was the Natural Reserve Les Follatères, near Martigny, in the valley of the Rhône River. This site is characterized by high continentality and by steep south-facing slopes with co-occurrent relict steppic species like *Euphorbia seguieriana*, *Adonis vernalis*, *Stachys recta* and sub-Mediterranean xero-thermophilous species like *Alyssoides utriculata*, *Orlaya grandiflora*, *Saponaria ocymoides*. During this day, our group was joined by Stefan Eggenberg, the main author of the renowned works "Flora Vegetativa" and "Flora Helvetica".

**The first biodiversity plot.**

**Sampling dry grasslands in Les Follatères Reserve.**

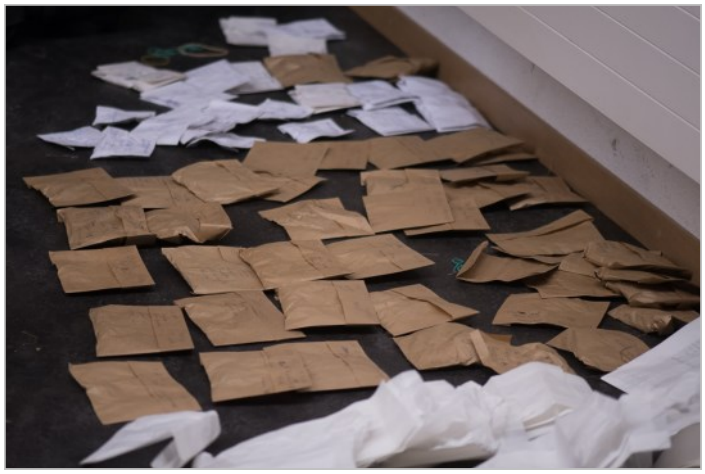
**Left: some military fortifications - right: excursion led by S. Eggenberg.**

**Day 3 (May 13, 2019)**
On the third day, we sampled in different localities: the first was near Sion, on the Mont d'Orge hill. Here we were introduced to many species whose epithets came after the name of the Valais Valley – *Artemisia vallesiaca*, *Festuca valesiaca, Centaurea valesiaca*, *Koeleria vallesiana*. After the lunch near the ruins of Montorge Castle, our next destination was moraine slopes near the village St. Martin. Here, a part of our team sampled dry and semi-dry grazed grasslands dominated by *Bromus erectus*, *Festuca valesiaca* and *Stipa capillata*, at an elevation of about 1,000 m a.s.l. The other group sampled dry grasslands near the village of Charat-Vison. On the way home, we stopped for some relevés in semi-dry grasslands near the village of Vex.


**Left: Sion castles - right: Valais Valley.**


**Left: *Ephedra distachya* subsp. *helvetica* - right: orchids, among others *Orchis morio*, are quite common in semi-dry to dry grasslands.**


**Left: moraine slopes near St. Martin village - right: the village of Luette.**



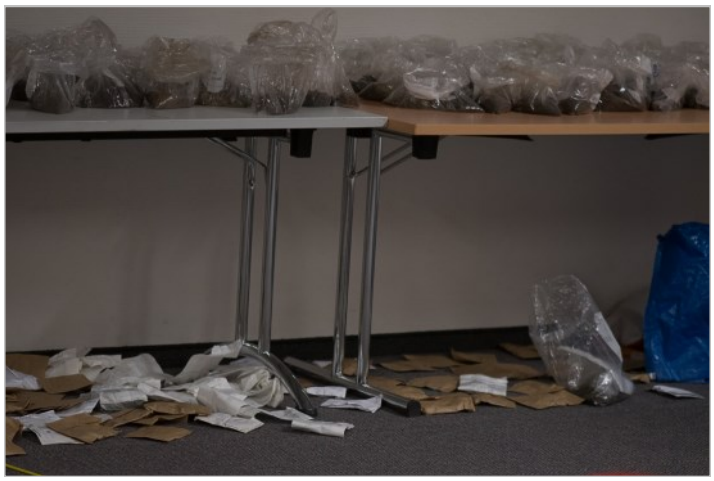
**Evening species identification.**

**Day 4 (May 14, 2019)**
In the morning, we visited Pfyn-Finges Nature Park. After a short introduction on the creation of the park and its many projects, we sampled alluvial steppe on cleared stony areas of the floodplain of the Rhône River. Here we had the poorest plot in our expedition – 9 species per 10 $m^2$. This site is memorable for one more attractive species named after the Valais Valley: *Matthiola valesiaca*.
After having lunch near the scenic Feschilju Gorge, we sampled rocky steppes on the not less gorgeous southern slopes of the Valais Valley, near the Leuk municipality with the snow-capped mountains on the horizon. Here we met *Stipa eriocaulis*, *Festuca valesiaca* and *Poa perconcinna* dominated communities. In the evening, we arrived at our second accommodation: Hotel Olympica in Brig.

**Above: Introductory meeting with Evelyne Oberhummer from the Regional Natural Park Pfyn-Finges - below: sampling in the floodplain of the Rhône River.**


**Left: an old bridge under the Feschilju Gorge, Leuk - right: *Stipa eriocaulis*-dominated grasslands.**


**Left: rocky dry grassland near Leuk - right: sampling the community with *Poa perconcinna.***

**Left: the impressive Valais valley - right: drying soil samples and cryptogams.**

**Day 5 (May 15, 2019)**

During the fifth day, we continued moving eastward along the Valais Valley. In the morning we climbed one of the highest localities in our expedition – near Zeneggen (around 1500 m a.s.l.). This place is famous for a population of *Astragalus exscapus*, which is preserved here very well. We were guided by the owner of the nice grasslands that we sampled. After lunch, we recorded relevés near Leuk, Raron and Turtmann along the characteristic "Adonis path", in beautiful grasslands full of *Adonis vernalis* in full bloom.

**One of the highest localities in our expedition – near Zeneggen.**

**Left: working in the morning near Zeneggen - right: being in nature always gives one a good appetite, especially after work.**

**Left: observing animal taxa, such as grasshoppers ☺ - right: short break before sampling.**

**Xerothermic vegetation with *Stipa pennata* aggr. (above) and *Adonis vernalis* (below).**

**Day 6 (May 16, 2019)**
In the morning, we did our last stop for sampling in the Valais Valley, in the nature reserve of cantonal importance Achera-Biela near Brig-Glis town. Later we moved via the high mountain pass "Oberalp" (elevation 2,044 m a.s.l.) to the Canton of Grisons. In the late afternoon we sampled semi-dry grasslands of the protected area Fatschis near Trin municipality. In the evening, we arrived at our next accommodation in the old village Casti-Wergenstein, high in the mountains. After dinner we heard the presentation of Sebastian Nagelmüller about the Beverin Nature Park.

**Achera-Biela protected area.**

**Feeding local fauna near Achera-Biela.**


**Left: lunch among the snow-capped mountains on the way to the Oberalp pass - right: Left: passing the Alps.**

**In the field with a merry mood.**

**Left: colourful semi-dry grassland in protected area Fatschis near Trin - right: in the village Casti-Wergenstein, we stayed in an old traditional house.**

**Day 7 (May 17, 2019)**
During the first half of the day we sampled grazed semi-dry grasslands near our accommodation- as part of Beverin Nature Park. Afterwards we enjoyed the view of the snow and the early flowering *Pulsatilla verna* and *Crocus vernus* at Julierpass (2,284 m a.s.l.). After lunch, we sampled the dry grasslands near Zernez village. In the evening we stayed in the Berghaus Outdoor-Center Rezia-Martina in the lowest point of the Engadine, close to the Austrian border.


**Beverin Nature Park.**


**Left: sampling in the Beverin Nature Park right: traditional architecture in the village of Casti-Wergenstein.**



**Left: Steep plot - right: Julierpass (2,284 m a.s.l.) – the highest point of the Alps that we climbed during the expedition.**

**Day 8 (May 18, 2019)**
During this day we enjoyed sampling the vegetation in the Inn Valley. In the morning we worked near Sent. After having lunch in Ardez, a beautiful village with its characteristic painted houses, we sampled grasslands on the hill with the Medieaval Steinsberg castle. Later in the afternoon we visited another place near Susch.


**Left: Sampling the steepest plot during the expedition - right: rocky grassland of the Inn valley.**



**Painted houses in Ardez village.**

**Sampling near the Steinsberg castle.**

**Our last accommodation in Martina village, during the plant identification in the evening.**

**Day 9 (May 19, 2019)**

For the last day of our expedition we visited a site near Ramosch in the Inn Valley. Here we sampled meadow steppes of *Astragalo onobrychidis-Brometum* in the *locus classicus*, near the ruins of the Medieval castle. On the way back to Wädenswil, already in the Rhine catchment, we also sampled dry grasslands near Grüsch. It was a very nice, well-organized expedition which will remain in our memories.

**Sampling near the Ramosch castle.**

**Animal paths on the slopes with dry grasslands in Grüsch.**

**Last lunch of the expedition and farewell words.**

# Selected pictures of plants

***Matthiola valesiaca, Alyssoides utriculata, Poa perconcinna, Orchis ustulata*.**

***Thalictrum foetidum, Salvia pratensis, Clypeola jonthlaspi, Ephedra distachya subsp. helvetica.***

***Koeleria vallesiana*, *Orlaya grandiflora*, *Nonea pulla.***

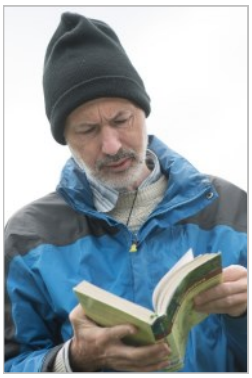
# Participants of the 12th EDGG Field Workshop in Switzerland

**Jürgen Dengler**

**Chiara Catalano**

**Susanne Riedel**

**Iwona Dembicz**



**Wolfgang Willner**

**Eline Staubli**

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**Beata Cykowska-Marzencka**

**Martina Monigatti**

**Denys Vynokurov**

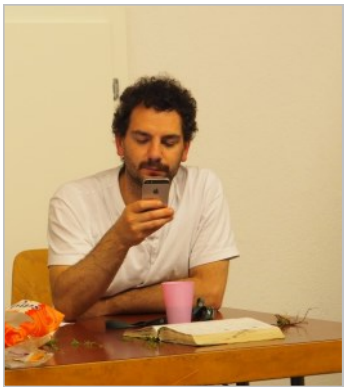
**Jonathan Pachlatko**

**Riccardo Guarino**

**Jamyra Gehler**

**Ivan Moysiyenko**

**Daniel Hepenstrick**



**Manuel Babbi**

**Stefan Eggenberg**

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# 730,000 hectares of grasslands are included in the Emerald Network of Ukraine

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**Abstract**

The Emerald Network of Europe is analogous to the Natura 2000 network and is being developed in non-EU countries. As a result of three years work by the Ukrainian Nature Conservation Group, 106 new Emerald sites were added to the Emerald Network of Ukraine in December 2019, which affords adequate protection for 730,000 hectares of grasslands. This has addressed a significant shortcoming of the previous version of the network, which predominantly comprised existing nature conservation areas - reserves and national parks and in which forest and water habitats prevailed. Of the recently designated sites, 86 include different types of grassland habitats covering 12 types from Resolution 4 of the Bern Convention: 11 from group E (E1.11, E1.13, E1.2, E1.7 1, E1.9, E2.2, E2.3, E3.4, E3.5 E5.4, E6.2) and a complex type (X36) dominated by herbaceous vegetation. The most common type among them is E1.2 - Perennial calcareous grassland and basic steppes, which is represented in 63 (73.3%) of the newly designated sites. The most valuable sites are those created to protect habitat types included in Resolution 4 by proposals from Ukraine, namely E1.13 - Continental dry rocky steppic grasslands and dwarf scrub on chalk outcrops, and X36 – Depressions (pody) of the Steppe zone.

**Keywords:** Berne Convention; chalk outcrop; conservation; Emerald Network; grassland; habitat; “pody”; steppe.

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## Introduction

The Emerald Network is a network of nature conservation areas important for the protection of species and habitats in need of conservation throughout Europe. The network is analogous to the Natura 2000 network of the European Union. During a meeting of the Standing Committee of the Berne Convention, held in Strasbourg on 3-6 December, 2019, Ukraine's proposal to include 106 new sites (including 730,000 hectares of grasslands, see Table 1) into the Emerald Network was accepted (Council of Europe 2019a). Upon Ukraine's accession to the EU, these territories would be automatically included in the Natura 2000 network.

The decision to include these new areas (a total of 1,600,000 hectares) was taken at the request of Ukraine and was the result of work by experts of the NGO Ukrainian Nature Conservation Group. The Group was formally established in early 2018 to bring together biodiversity experts, develop a network of conservation areas, and implement best environmental law practices in Ukraine. Thus, the development of new Emerald Network sites became a major focus of collaboration for members of the organisation.

## Outcomes

For about three years, 20 members of the Group and 40 other biologists who wished to join this initiative prepared justifications for the designation of new Emerald sites. Thanks to the support of the Ministry of Ecology and Natural Resources, in 2018 one of the members of the organisation, Oleksiy Marushchak, was trained to work with the Emerald Network database and to prepare reports together with the Ministry's representative Anastasia Drapaluk. The training was provided by the Standing Committee of the Berne Convention. This enabled us to directly prepare standard data forms (SDFs) for the proposed Emerald sites. Following approval in principle and review, the proposals we prepared for 106 new Emerald sites were submitted by the Ministry for consideration by the Convention. All of the sites were incorporated into the Emerald Network on 4 December, 2019. In 2017-2018, thanks to the support of our Polish colleagues, the Natural Heritage Foundation, we were able to organise a series of training courses (covering 400 scientists and 400 students in 12 cities) and webinars. In addition, we published a series of Emerald Network devel-

opment guides: http://uncg.org.ua/tag/emerald_book/. However, the actual work on the development of new Emerald sites had no special funding and was carried out by experts on a voluntary basis.

The preliminary list of Emerald sites for Ukraine was adopted in 2016 (Council of Europe 2018) and at that time it mainly comprised all existing nature reserves and national nature parks. The total area of the network then was 5.8 million hectares (9% of the land area of Ukraine), but this did not produce significant additional conservation benefits, as 3.6 million hectares (5.7% of the land area of Ukraine, or 57% of the total area of Emerald sites in Ukraine) were territories that were already protected. Another 1% of the area of Ukraine (or 10% of the network area) consisted of the reservoirs of the Dnieper cascade, which play an important role as a migratory route for migratory birds. However, the open water surface of the reservoirs is little used by birds, so their inclusion in the Emerald Network hardly had a significant effect. Therefore, only 33% of the Emerald Network in Ukraine (2.5% of Ukraine's area) in 2016 became territories for which inclusion in the network marked a real change by obtaining conservation status.

Moreover, almost all Emerald sites, until recently, were chiefly represented by forest habitat types. Thus, the network was rather unrepresentative. On the other hand, almost all forests in Ukraine which are part of national parks or reserves are among the best preserved forests, since Ukrainian legislation restricts or prohibits felling in protected areas. Thus, the first version of the Emerald Network included most of Ukraine's truly valuable forests.

Our work was primarily focused on identification of valuable natural areas that were characterised either by the uniqueness of species and habitats, or had a large number of species and habitats listed in the Berne Convention resolutions. Particular attention was paid to grassland habitats, as they were very poorly represented in the network because in Ukraine, apart from a few steppe reserves in the east of the country, grassland habitats were barely covered by protected areas. Developing new grassland sites was particularly pleasing for many of us, as several authors of the new Emerald sites are members of the EDGG.

1.6 million hectares of new territory have now been added to the Emerald Network (Fig. 1). Emerald sites that were officially recognised in December are exclusively natural territories and took the numbering from UA0000271 to UA0000377. In most cases, they are river valleys, steppe valleys and valuable forest areas in different regions of Ukraine. The great majority of these sites were not previously protected, and all of them are important for rare species and natural habitats in Europe. It is very important that many types of steppe habitats are protected in Ukraine because very few countries that are parties to the Berne Convention have true steppes. Furthermore, habitat types E1.13 Continental dry rocky steppic grasslands and dwarf scrub on chalk outcrops; G3.4G *Pinus sylvestris* forest on chalk in the steppe zone; and X36 Depressions (pody) of the steppe zone were included in Resolution 4 at the request of Ukraine (Council of Europe 2019b), as these habitat types are absent in other European countries, except for the Russian Federation. It is important to note that seven sites were created specifically to conserve X36 habitats. In total, almost half of the areas included in the Ukrainian part of the Emerald Network in 2019 are represented by grassland habitat types.

The largest of the newly designated sites are important for the implementation of recent Convention decisions. For example, the Aidar river valley site (UA0000313, 117,237 ha) includes Ukraine's most extensive areas of habitat types E1.13 and G3.4G. Similarly, the Kerch peninsula site (UA0000377, 231,364 ha) is almost completely covered by E1.2 and includes autochthonous mud volcanoes that are included in H6 - Recent volcanic features - from the 2018 revision of the scope and definition of this habitat type that was also suggested by Ukraine.

## Outlook

Importantly, the designation of these 106 Emerald sites is only the start of expanding the Emerald network in Ukraine. Work is currently underway to prepare the next proposal, covering another 2 million hectares, of which the grasslands occupy at least half of the area. Among them, the most notable is the complex of sites in the Luhansk region (eastern Ukraine), covering a total of 400,000 ha of rocky steppes along the Donetsk Ridge.

## Author contributions

A.K. and O.V. jointly developed the publication structure and drafted the manuscript. O.M. prepared data on the presence of different grassland habitat types in the newly adopted Emerald sites, while G.K. calculated the total area of grassland habitats in the newly adopted Emerald sites. All authors critically revised the manuscript.

## Acknowledgments

We are sincerely grateful to Anastasia Drapalyuk from the Ministry of Energy and Environmental Protection of Ukraine, without whose efforts our work would not have reached its successful conclusion. In addition, we thank Maxym Marushchak for preparing the material for this publication.

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**Table 1. Grassland habitats in the new Emerald sites of Ukraine.**

| Site Code | Site Name | Habitat types present |
|---|---|---|
| UA0000272 | Ros river valley | E1.11, E1.2, E1.9, E2.2, E3.4 |
| UA0000278 | Roganka | E1.2, E2.2 |
| UA0000279 | Lyptsi | E1.2, E2.2 |
| UA0000280 | Kam`yanka izyums`ka | E1.2, E2.2 |
| UA0000281 | Izbytske | E1.2, E2.2 |
| UA0000282 | Dry and Wet Izyumtsi | E1.2, E2.2 |
| UA0000283 | Dergachivskyi forest | E1.2, E2.2 |
| UA0000284 | Chumatskyi way and Vilshanka river valley | E1.2, E2.2 |
| UA0000286 | Goryla valley | E2.2 |
| UA0000287 | Upper part of Great Babka river | E1.2, E2.2 |
| UA0000288 | Bezruki | E1.2, E2.2 |
| UA0000289 | Poligon | E1.2, E2.2 |
| UA0000290 | Balakliyky | E1.2, E2.2 |
| UA0000291 | Zavody | E1.2, E2.2, E1.13 |
| UA0000292 | Upper part of Uda river valley | E1.2, E2.2 |
| UA0000293 | Lyman lake system | E1.2, E2.2, E3.4 |
| UA0000294 | Lozovenka and Oleksiyivski forests | E1.2, E2.2 |
| UA0000295 | Lower part of Uda river valley | E2.2 |
| UA0000296 | Lysogirka izyumska | E2.2 |
| UA0000297 | Protopopivka-Petrivs'ke | E1.2, E1.13, E2.2, E3.4 |
| UA0000298 | Petrivski creeks | E1.2, E2.2 |
| UA0000299 | Mozh river valley | E1.2, E2.2, E3.4 |
| UA0000300 | Bilokuzmynivske | E1.2, E1.13, E2.2 |
| UA0000301 | Barvinkivski steppes | E1.2 |
| UA0000302 | Supiy river valley | E1.2, E2.2, E3.4 |
| UA0000303 | Upper Psel river valley | E1.2, E2.2, E3.4, E5.4 |
| UA0000304 | Upper Inhul river valley | E1.11, E3.4 |
| UA0000305 | Middle Inhul river valley | E1.11, E1.2 |
| UA0000306 | Khorol river valle | E1.2, E2.2, E3.4, E5.4, E6.2 |
| UA0000307 | Gromoklia river valley | E1.2 |
| UA0000309 | Sula river valley | E1.2, E2.2, E3.4, E5.4 |
| UA0000310 | Middle Inhulets river valley | E1.2 |
| UA0000312 | Lower and middle Psel river valley | E1.2, E2.2, E3.4, E5.4 |
| UA0000313 | Aidar river valley | E1.13, E1.2, E1.11, E1.2 |
| UA0000314 | Kalmius river valley | E1.13, E1.2, E1.11, |
| UA0000318 | Oleksandriyska part of Inhulets | E1.2, E3.4 |
| UA0000319 | Kryvorizka part of Inhulets river | E1.11, E1.2 |
| UA0000320 | Teteriv river valley | E1.11, E2.2, E3.4 |
| UA0000321 | Lower Inhulets river valley | E1.2, E1.9, E6.2 |
| UA0000322 | Vihor river valley | E2.2, E3.4, E5.4 |
| UA0000323 | Vyrva river valley | E2.2, E3.4, E5.4 |
| UA0000324 | Strviazh river valley | E2.2, E3.4, E5.4 |
| UA0000325 | Opir river valley | E2.2, E5.4 |
| UA0000326 | Stryi river valley | E2.2, E3.4, E5.4 |
| UA0000328 | Kolomak river valley | E2.2, E3.4, E5.4 |
| UA0000329 | Zolotonoshka river valley | E1.2, E2.2, E3.4 |
| UA0000331 | Kropyvna river valley | E1.2, E3.4, E6.2 |
| UA0000332 | Dniester river valley in Lviv region | E1.71, E2.2, E3.4, E5.4 |
| UA0000333 | Southern Bug and Snyvoda valleys in Vinnytsya region | E1.11, E1.2, E1.71, E1.9, E2.2, E3.4, E5.4 |
| UA0000334 | Styr river valley in Volyn region | E1.71, E1.9, E2.2, E3.4, E3.5 |
| UA0000335 | Sluch river valley in Zhytomyr region | E1.9, E2.2, E3.4 |
| UA0000336 | Loess outcrops of the Dnipro estuary | E1.2 |
| UA0000337 | Divychky | E1.9, E2.2 |
| UA0000341 | Nyzhniopodilskyi | E1.11, E1.2, E3.4 |
| UA0000342 | Irpin river valley | E1.9, E2.2, E3.4, E3.5 |
| UA0000343 | Bus'ke | E2.2, E3.4, E3.5 |
| UA0000344 | Ikva river valley in Ternopil region | E1.11, E2.2, |
| UA0000346 | Bober river valley | E1.9, E2.2, E3.4 |
| UA0000347 | Sluch river valley in Rivne region | E1.9, E2.2, E3.4 |
| UA0000348 | Irsha river valley in Zhytomyr region | E1.9, E2.2, E3.4 |
| UA0000349 | Kayalo-Berdyanskyi | E1.2 |
| UA0000351 | Tulyntsi – Makedony | E1.2 |
| UA0000352 | Kovylna | E1.2 |
| UA0000353 | Sary-Bash | E1.2 |
| UA0000354 | Slavne | E1.2 |
| UA0000355 | Lower Seret river valley | E1.11, E1.2 |
| UA0000358 | Kadubivska stinka | E1.2 |
| UA0000359 | Podvirivka | E1.2, E2.2 |
| UA0000359 | Podvirivka | E1.2 |
| UA0000360 | Pohorylivka | E1.2 |
| UA0000361 | Sinozhati | E1.2 |
| UA0000362 | Vyshnivka | E1.2, E2.2, E3.4 |
| UA0000363 | Dzhohul | E1.71, E2.2, E3.4 |
| UA0000364 | Vasylivski i Rozkopynski gullies | E1.2 |
| UA0000365 | Bystrytsia of Nadvirna river valley | E2.3, E5.4 |
| UA0000366 | Ahaymany depression | X36 |
| UA0000367 | Barnashivsky depression | E1.2, X36 |
| UA0000368 | Black valley | E1.2, X36 |
| UA0000370 | Green depression | E1.2, X36 |
| UA0000371 | Sivashic depression | E1.2, X36 |
| UA0000372 | Small Chapelsk depression | E1.2, X36 |
| UA0000373 | Foothill steppes of Crimea | E1.2 |
| UA0000374 | Shopurka river valley | E2.2 |
| UA0000375 | Murava way | E1.2 |
| UA0000376 | Tarkhankut | E1.2 |
| UA0000377 | Kerch peninsula | E1.2 |

**Site UA0000300 Bilokuzmynivske. Photo: D. Balkhovitin.**

**Site UA0000300 Bilokuzmynivske. Photo: S. Orlyk.**

**Site UA0000300 Bilokuzmynivske. Photo: V. Bashkatov.**

**Site UA0000300 Bilokuzmynivske. Photo: V. Bashkatov.**

**Site UA0000314 Kalmius river valley. Photo: V. Bashkatov.**

**Site UA0000314 Kalmius river valley. Photo: D. Balkhovitin.**

Site UA0000377 Kerch peninsula, mud volcanoes. Photo: I. Dereviagin.

Site UA0000377 Kerch peninsula, mud volcanoes. Photo: I. Dereviagin.

Site UA0000377 Kerch peninsula. Photo: D. Vitchenko.

Site UA0000321 Lower Inhulets river valley. Photo: V. Maniuk.

## *Photo Competition*

# Best Shots of "Grasses and grasslands"

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 & Salza Palpurina.

### 1st place

***Stipa ucrainica*, *Koeleria macrantha* and *Poa bulbosa.* Askania-Nova Biophere Reserve, Ukraine. Author: Iwona Dembicz, Poland & Switzerland,** i.dembicz@gmail.com**.**
Panasonic DMC-G3; f/6.3, 320 s, ISO-400, focal lenght 136 mm

**Reviews from the Jury:**

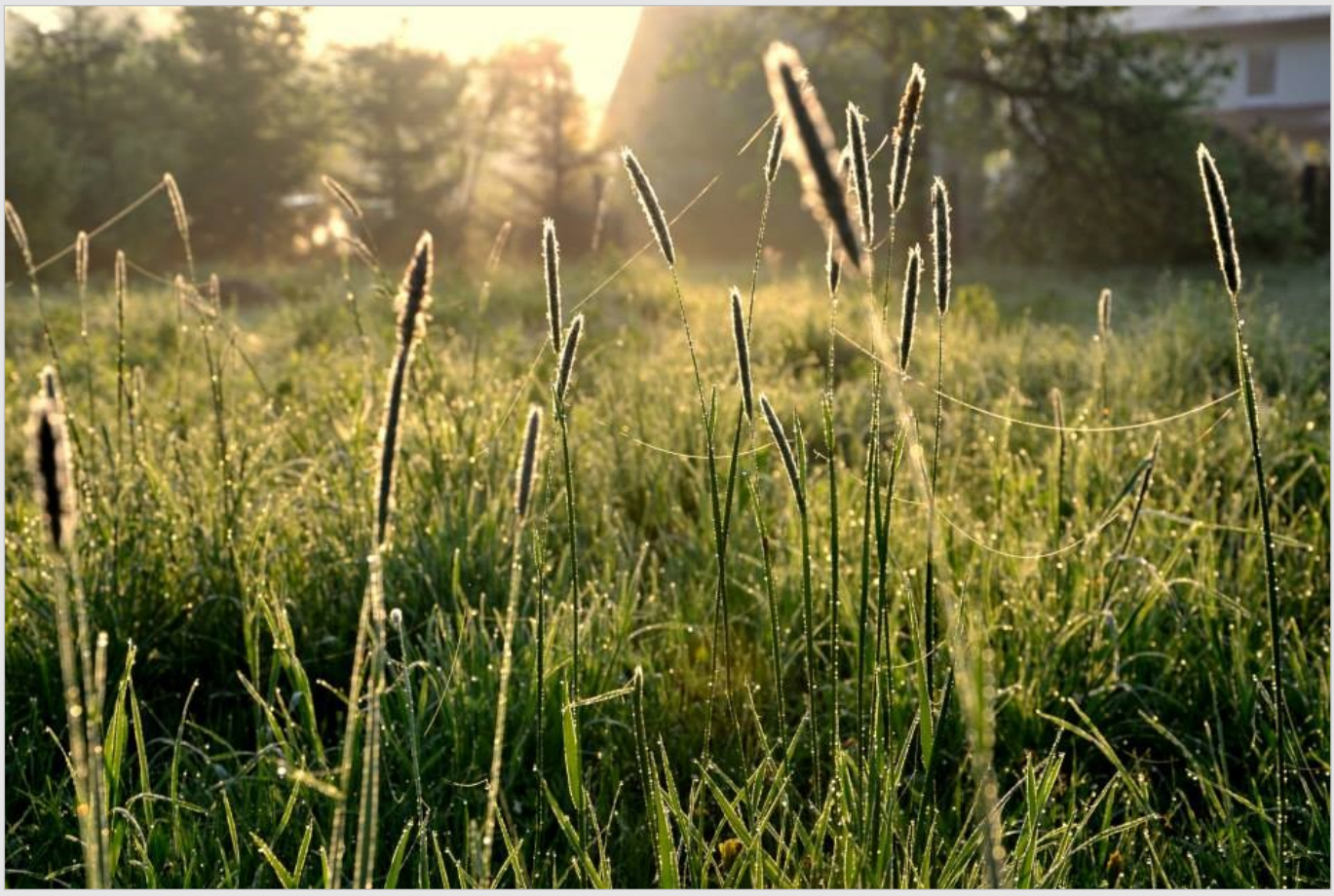
*"An atmospheric photo across the grassland with the light highlighting the diversity of structure and the different types of flowering heads."*

*"The warm colors here make the picture dreamy, and one can almost drift away into the depth, just gazing through the grass."*

*"Several species of grasses are harmoniously combined in this photo. The author managed to show the beauty of each of them in the rays of the setting sun, which gave the whole photo a very beautiful pink-orange color. The orange reflections on the feather grass and the spikelets of hair-grass are just amazing."*

*"Like in L'Angélus of Millet, in the act of bowing grasses are showing the immense dignity of their being."*

## 2nd place



**Grasses is the main electric wire poles in the meadows city. Vilnius, Lithuania. Author: Vilma Gudynienė, Lithuania,** vilma.gudyniene@gmail.com**.**

**Reviews from the Jury:**

*"I loved the way the photo captured the early morning sun on the grassland with the gossamer draped amongst the grasses."*

*"Light and sparkling dewdrops are what make grasses particularly attractive. The soft light of the rising sun, as well as some blurring of both the foreground and the background, give this photo some mystery."*

**3$^{3d}$ place:**

**Forb-bunchgrass steppe, dominated by *Stipa ucrainica* and *Stipa lessingiana*, National Nature Park Buzkyi Gard (Ukraine, Mykolaiv region). Author: Dariia Shyriaieva, Ukraine, darshyr@gmail.com.**

**Reviews from the Jury:**

*"In this picture a sea of grass is in contrast with a sea of water. How magnificent is the brightness of this grassland in contrast with the darkness of the water in the background."*

*"With a dress made of silver and sapphire, the hill and the river celebrate the enchanting beauty of grassland."*

## *Short Contributions*

# Unique rocky grasslands under threat due to the hydropower and nuclear power plant development in the National Nature Park Buzkyi Gard (South Ukraine)

National Nature Park Buzkyi Gard is located in the southern part of Ukraine. The park supports high levels of biodiversity and endemism due to the regions unique geological history and microclimate features. The Southern Bug River, which is one of the biggest rivers in Ukraine, flows here between the steep rocky shores, forming a narrow canyon-shaped valley with majestic granite rocks, cliffs, feather-grass and petrophytic steppe slopes, river rapids, and unique granitic islands.

The National Nature Park is characterized by a high level of diversity of zonal and azonal vegetation, represented mainly by zonal steppes and vegetation on granitic outcrops, wetlands, meadows, floodplain forests, shrubs, thermophilic and mesophilic deciduous forests. Flora of the territory includes around 900 vascular plant species. 34 plant species are protected by the Red Book of Ukraine (2009), two of them – the endemic species *Dianthus hypanicus* and *Moehringia hypanica* – are also included in Resolution 6 of the Bern Convention.

During the last decades, the territory acquired a number of conservation status: the *Regional Landscape Park "Granitno -Stepove Pobuzhzhya"* (6,266 ha) was created in 1994-1999; the culture memory territory *Historical landscape of the Center of Bugo-Gardivska Palanka of Zaporizhzhya Army* (1,305 ha) was designated in 2006; *National Nature Park Buzkyi Gard* (6,138 ha) in 2009; and inclusion as an *Emerald Network* site (6,148 ha) in 2016. Despite the value of the territory and the number of protections afforded, one of the major problems in the conservation of rare habitat types and endemic species is flooding by the Oleksandrivka water reservoir. This has resulted from the expansion of the South -Ukraine electric power producing complex. The valuable natural site Island Gard was partially flooded as a consequence of raising the Oleksandrivka reservoir level up to 16.0 m in 2006-2010, with the natural level for the river about 5 m above sea level.

In the near future, the level of the Oleksandrivka water reservoir could be raised to 20.7 m. The potential impact of projected flooding was studied by our working group in 2017-2019. We investigated the areas, which could be directly flooded or potentially indirectly affected by microclimatic changes, with a special view of rare species and habitat distribution.

According to the GIS modeling we carried out, a previous increase in the level of the reservoir from 8.0 m to 16.0 m caused flooding of natural landscapes with a total area of 704 ha in Southern Bug river valley and 200 ha in Bakshala river valley (Fig. 1). The flooding up to level 16.0 m affected large areas of floodplain meadows, wetlands, and grassland slopes in down part of the reservoir, and valuable sites of granitic outcrops, petrophytic steppes, deciduous forests and fast-flowing river with rapids in upper and middle parts of the reservoir. Changing the hydrological regime of reservoir banks caused mesophytisation of dry habitats, which were located on the middle and upper slopes of Southern Bug river valley before flooding, and the resulting spreading of native shrubs (*Crataegus spp., Prunus*

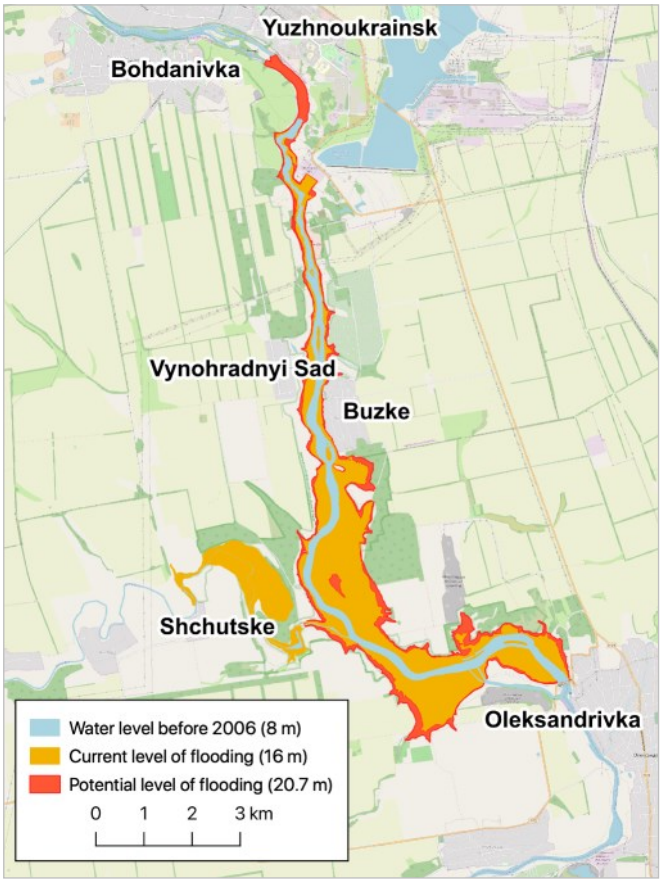



**Fig. 1. Oleksandrivske water reservoir in Southern Bug river valley with current and planned water level. Basemap: © OpenStreetMap contributors.**

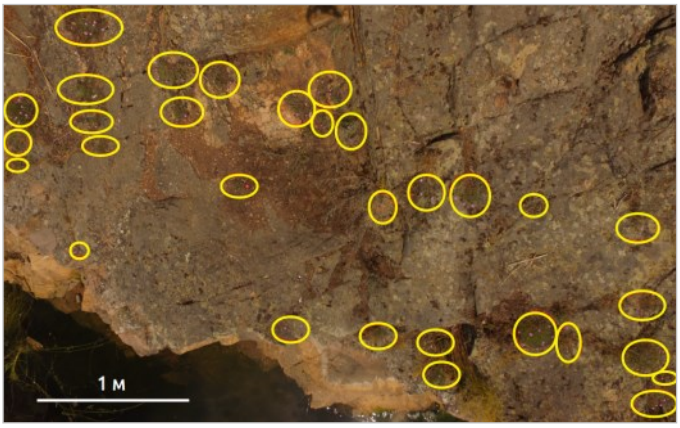



**Fig. 2. Part of detailed aerial drone photography mapping of the model site on granitic outcrops, in the zone of potential flooding. The yellow circles mark individual plants of *Dianthus hypanicus* – endemic of the territory of National Nature park Buzkyi Gard and surroundings areas of the Dnieper Upland. Photo: M. Khytruk.**

*stepposa, Rosa spp.*) and invasive herb and shrub species (*Acer negundo, Amorpha fruticosa, Robinia pseudoacacia, Elaeagnus angustifolia, Grindelia squarrosa*) into grassland and petrophytic habitats.

The planned raising of the level of the reservoir from 16.0 m to 20.7 m would affect natural and semi-natural landscapes with a total area of 254 ha in the Southern Bug river valley under risk. According to the habitat mapping, natural landscapes constitute 110 ha, whilst the remaining 144 ha of potentially flooded territories are synanthropic vegetation of villages (7 ha) and ruderal and semi-natural landscapes, transformed by previous flooding and strengthening of the banks of the reservoir (137 ha). Among the natural landscapes, habitats protected by Resolution 4 of the Berne Convention are represented by 17 types, their total area of direct flooding is 75.7 ha. More areas of such habitats would be indirect affected by changing in the hydrological regime and artificial strengthening of the banks of the reservoir, as it was after the previous flooding.

According to estimates, the average population density of the endemic species *Dianthus hypanicus* in the potential flooded zone is 4 individuals/m² (Fig. 2). The species has a very narrow range of optimal hydrological regime, and at least 88,000 individuals of *Dianthus hypanicus* would be lost due to direct flooding and indirect influence of the reservoir. Habitats of the endemic species *Moehringia hypanica* do not fall under direct flooding, but this species is very sensitive to changing of environmental conditions. So, two of three populations of this plant in the world may be under risk of extinction. *Moehringia hypanica*, it should be noted, does not survive to the generative age in botanical gardens.

The endemic species *Gymnospermium odessanum* is located on the northern border of the range in the vicinities of natural boundary Gard. Populations in the potential flooded zone have high density - up to 15-25 individuals/m². The only known location for the Southern Bug river valley population of the disjunctive species *Stachys angustifolia* (1,5 individuals/m²) in the lower and middle slopes would be also be lost as a result of direct flooding and indirect influence of the reservoir.

Populations of other rare species, listed in Red Book of Ukraine, also would be particularly affected by potential flooding: *Silene hypanica* (up to 4-6 individuals/m²), *Silene sytnikii* (0,2-0,5 individuals/m²); *Crocus reticulatus* (up to 30 individuals/m²), *Tulipa hypanica* (~ *T. biebersteiniana* Schult. f. s.l.) (5-20 individuals/m²), *Pulsatilla pratensis* (2-5 individuals/m²), *Adonis vernalis* (1-1,5 individuals/m²), *Fritillaria ruthenica* (1-1,5 individuals/m²), *Stipa spp.*

In general, 17 habitats protected by Resolution 4 of the Berne Convention and 12 plant species listed in the Red Data Book of Ukraine, including two species listed in Resolution 6 of the Berne Convention, would be affected by direct flooding and indirect influence. Among them, there are some of the most valuable areas of euro-Siberian rock debris swards and acid siliceous inland cliffs with habitats of the narrow endemic species *Dianthus hypanicus* and *Moehringia hypanica*. Areas of 9 habitat types, including thermophilous and mesophilous deciduous woodlands, are of high preservation priority because they are the southernmost in the Southern Bug river valley localities of such rare for the steppe zone habitats. Natural and historical site Gard, which could be characterized as a territory with unique biotope diversity and important environmental significance, has in particular being severely impacted by the previous flooding and could be finally lost in its entirety.

The latest scientific research in climatology, hydrology and nature conservation shows a negative impact as well as violation of international and national legal acts by the previous and the possible enlargement of the reservoir. Nevertheless, the final decision about flooding would be taken by the Government of Ukraine in 2020, after which the environmental impact assessment will be published and the public discussion will be held.

The fieldwork for the threat assessment was supported by the Rufford Small Grants Foundation “Rare Plant Species and Habitats of the National Nature Park “Buzkyi Gard”: Diversity, Conservation and Management Planning” (ID 27637-1).

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# Special Issue on Forest-Steppes

*forests*

Eurasian forest-steppes feature a unique mosaic of various grassland and forest habitats. Forest-steppes have an extremely high spatial heterogeneity of both environmental factors and plant communities as well as high taxonomic and functional diversities at both the local and the landscape scales. To contribute to a better understanding of forest-steppes, the journal Forests (IF: 2.116, Q1 ranking in the category 'forestry') is publishing a special issue with the tentative title 'Spatial Heterogeneity of Forest-Steppes.' Contributions from members of the Eurasian Dry Grassland Group are highly welcome. The deadline for manuscript submission is 10 September, 2020. Fast review process, constructive reviews and positive editorial attitudes are guaranteed!

For more information, please visit the website of the special issue:

https://www.mdpi.com/journal/forests/special_issues/Forest_Steppes

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# Symposium on the inner-Alpine dry meadows of the Terra Raetica

**The dry grasslands of the Vinschgau Valley have long been known to nature lovers from near and far. In a one-day symposium on 29 April 2020 in Silandro/Schlanders (Northern Italy, Bolzano province), the special features of this unique habitat will be presented, for the first time, to a wider audience.**

The famous botanist Josias Braun-Blanquet dedicated one of his main works to the inner-Alpine dry grasslands. Surprisingly, they are inhabited by animals and plants that are usually found only in the Hungarian lowlands and the steppes of Central Asia – for example the milkvetch *Astragalus exscapus* to the steppe grasshopper *Omocestus petraeus* and the colorful ladybird spider *Eresus kollari*. The unique features of the dry grasslands of the Vinschgau Valley, which is surrounded by high mountain ranges such as the Ortler and Weißkugel groups, result from low annual precipitation and steep slopes that heat up in summer but freeze during winter.

The conference is organized by the research center Eurac Research, the Museum of Nature South Tyrol, the Department of the Autonomous Province of Bolzano/Bozen and the Municipality of Silandro/Schlanders. The symposium intends to be a meeting place for experts and aims to raise public awareness of this interesting grassland type. The original idea for the conference came from the "Dry Grassland Working Group" of the Interreg region Terra Raetica in the border triangle of Austria, Italy and Switzerland.

The conference will be opened with a lecture by EDGG secretary general Jürgen Dengler, followed by a talk on the global importance of the steppe islands in the Alps by Philipp Kirschner from the University of Innsbruck. More talks on the bird and butterfly fauna and the dry grassland flora as well as lectures on the cultural history and the conservation of the dry grasslands in the Vinschgau valley will complete the symposium. Guest contributions from the other parts of the Terra Raetica, the Lower Engadine, Val Müstair and the Upper Inn Valley will also be included.

The conference will take place at the Kulturhaus Karl Schönherr in Silandro from 9:00 to 18:00 on April 29, 2020.

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***Stipo-Poion* communities. Photo: A. Hilpold.**

***Plebejus argus*. Photo: A. Hilpold.**

# *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.

Hellegers, M., Ozinga, W.A., van Hinsberg, A., Huijbregts, M.A.J., Hennekens, S.M., Schaminee, J.H.J., **Dengler, J.** & Schipper, A.M. 2020. Evaluating the ecological realism of plant species distribution models with ecological indicator values. *Ecography* 43: 161–170.

Berg, C., Ewald, J., Hobohm, C. & **Dengler, J.** in press. The whole and its parts: why and how to disentangle plant communities and synusiae in vegetation classification. *Applied Vegetation Science* 23: 127–135.

Weigand, A., Abrahamczyk, S., Aubin, I., Biţă-Nicolae, C., Bruelheide, H., Carvajal-Hernández, C., Cicuzza, D., da Costa, L.E.M., Csiky, J., **Dengler, J**., de Gasper, A.L., Guerin, G.R., Haider, S., Hernandez, A.R., Jandt, U., Reyes -Chávez, J., Karger, D.N., Khine, P.K., Kluge, J., Krömer, T., Lehnert, M., Lenoir, J., Moulatlet, G.M., Mualin, D.A., Noben, S., Olivares, I., Quintanilla, L.G., Reich, P.B., Salazar, L., Silva-Mijangos, L., Tuomisto, H., Weigelt, P., Zuquim, G., Kreft, H. & Kessler, M. in press. Global fern and lycophyte richness explained: How regional and local factors shape plot richness. *Journal of Biogeography* 60: 59–71.

**Dengler, J.**, Matthews, T.J., Steinbauer, M.J., Wolfrum, S., Boch, S., Chiarucci, A., Conradi, T., Dembicz, I., Marcenò, C., García-Mijangos, I., Nowak, A., Storch, D., Ulrich, W., Campos, J.A., Cancellieri, L., Carboni, M., Ciaschetti, G., De Frenne, P., Doležal, J., Dolnik, C., Essl, F., Fantinato, E., Filibeck, G., Grytnes, J.-A., Guarino, R., Güler, B., Janišová, M., Klichowska, E., Kozub, Ł., Kuzemko, A., Manthey, M., Mimet, A., Naqinezhad, A., Pedersen, C., Peet, R.K., Pellissier, V., Pielech, R., Potenza, G., Rosati, L., Terzi, M., Valkó, O., Vynokurov, D., White, H., Winkler, M. & **Biurrun, I.** 2020. Species-area relationships in continuous vegetation: Evidence from Palaearctic grasslands. *Journal of Biogeography* 60: 72–86.

Plenk, K., Willner, W., Demina, O.N., Höhn, M., **Kuzemko, A.**, Vassilev, K. & Kropf, M. in press. Phylogeographic evidence for long-term persistence of the Eurasian steppe plant *Astragalus onobrychis* in the Pannonian region (eastern Central Europe). *Flora* https://doi.org/10.1016/j.flora.2020.151555

***Adonis vernalis* in a semi-dry continental grassland of Valais, Switzerland. Photo: J. Dengler.**

# *Forthcoming Events*

**14th annual meeting of the specialist group Macroecology of the Ecological Society of Germany, Austria, and Switzerland: "Macroecology of the Anthropocene"**
2-5 March 2020, Konstanz, Germany
Conference website: https://www.biologie.uni-konstanz.de/kleunen/macro-2020/

**The International Biogeography Society Early Career Conference**
17-19 April 2020 in Amsterdam, the Netherlands
Conference website: https://www.biogeography.org/event/early-career-conference-amsterdam/

**29th European Vegetation Survey Meeting**
4-7 May 2020, Rome, Italy
Conference website: http://evs2020roma.info

**14th EDGG Field Workshop: Ukrainian steppes along climatic gradients**
25 May-3 June 2020, Ukraine
See details in *Palaearctic Grasslands* 44, on pp. 6-15.
FW webpage: https://edgg.org/fieldworkshop2020

**10th International Conference on Serpentine Ecology (ICSE 10)**
21-30 June 2020, Ekaterinburg, Russia
Conference website: http://icse10.urfu.ru

**28th General Meeting of the European Grassland Federation**
22-25 June 2020, Helsinki, Finland
Conference website: www.egf2020.fi

**2nd Quarries alive International Conference**
24-26 June 2020, Liege, Belgium
Conference website: http://www.gembloux.ulg.ac.be/qa2020/

**Modelling in Ecology and Evolution Meeting (MEEM)**
25-26 June 2020, Lausanne, Switzerland
Event website: www.meem2020.org

**63rd IAVS Symposium: Vegetation in the Anthropocene**
20-24 July 2020, Vladivostok, Russia
Symposium website: http://geobotanica.ru/symposium_2020/

**13th Clonal Plant Meeting /Clone 2020/**
26-29 August 2020, Camerino, Italy
Event website: http://clone2020.unicam.it/

**12th European Conference on Ecological Restoration SER 2020**
31 August-4 September 2020, Alicante, Spain
Conference website: https://chapter.ser.org/europe/event/alicante-spain-ser-europe-conference/

**17th Eurasian Grassland Conference: Grassland dynamics and conservation in a changing world**
7-13 September 2020, Tolosa, Spain
See details in this issue, on pp. 6-20.
Conference webpage https://edgg.org/egc2020

**50th Annual Meeting of the Ecological Society of Germany, Austria and Switzerland**
14-18 September 2020, Braunschweig, Germany
Conference website: https://www.gfoe-conference.de/

**11th International Conference on Ecological Informatics (ICEI:2020)**
17-21 November 2020, Thiruvnanthapuram, India
Event website: https://www.iiitmk.ac.in/cvrlei/icei2020/index.html

**18th Eurasian Grassland Conference**
Summer 2021, Hungary

**15th EDGG Field Workshop:**
Summer 2021, South Tyrol (Vintschgau, Veltlin, etc.), Italy

**19th Eurasian Grassland Conference**
Late summer 2022, Bolzano, Italy

**16th EDGG Field Workshop**
Summer 2022, Picos de Europa, Northern Spain

**Winter flower of *Romulea bulbocodium*, Puglia, Italy. Photo: R. Labadessa.**

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

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

***EDGG on the ResearchGate***
https://www.researchgate.net/project/EDGG-Eurasian-DryGrassland-Group

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 21 February 2020, it had 1332 members from 63 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 subgroup 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.

# *EDGG Executive Committee and responsibilities of its members*

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**Bunchgrass steppe in the morning, Askania Nova Natural Biosphere Reserve, Kherson region, Ukraine. Photo: D. Shyriaieva.**