



# Bulletin 36

## of the Eurasian Dry Grassland Group

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***Dear members of the Eurasian Dry Grassland Group,***

*We present you the new issue of the EDGG Bulletin, in which you will find detailed announcements of two annual events of our group - the Eurasian Grassland Conference, which will be held in Sulmona (Italy) from 4 to 8 June and the Field Workshop in inneralpine dry valleys, Austria from 6 to 13 July. We hope that they will attract your attention and you will find a place for them in the upcoming field season. Additionally, you can find a report from the last Field Workshop, which took place in Italy, with a detailed photo diary. You can learn about the project on grassland management from Spanish colleagues and about the invitation to an interesting PhD study on the Carpathian grassland in Slovakia.*

*As you can read on page 3, we have recently substantially enlarged the Editorial Board to improve the Bulletin even more in the future; more details on the persons in the Board and our plans you then can read in the next issue fo the Bulletin*

*We hope that reading the Bulletin in the early days of spring will inspire you to new ideas and achievements*

*Anna Kuzemko and Idoia Biurrun  
with Jürgen Dengler, Péter Török, & Stephen Venn*

At the top:

*Dry grassland on volcanic substrates of Mt. Etna, Italy. Photo: R. Labadessa.*

## Eurasian Dry Grassland Group (EDGG)

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.

To become a member of the Eurasian Dry Grassland Group, please send an e-mail to Idoia Biurrun, including your name and complete address. More detailed information can be found at:

[http://www.edgg.org/about\\_us.htm](http://www.edgg.org/about_us.htm)

As of 26<sup>th</sup> February 2018, the EDGG had 1265 members from 67 countries. While we are well-represented in most European countries, though with some few European countries still underrepresented, the extra-European part of the Palaearctic realm (which according to our Bylaws is included in the geographic scope of the EDGG!) is still grossly underrepresented.

The aims of the EDGG are:

- to compile and distribute information on research and conservation of natural and semi-natural grasslands beyond national borders;
- to stimulate active cooperation among grassland scientists (exchanging data, common data standards, joint projects).

To achieve its aims, the EDGG provides nine instruments for the exchange of information among grassland researchers and conservationists:

- **the Bulletin of the EDGG** (published quarterly);
- **the EDGG website** ([www.edgg.org](http://www.edgg.org));
- e-mails via our **mailing list** on urgent issues;
- **the Eurasian Grassland Conference** - organized annually at different locations throughout the Palaearctic Realm;
- **EDGG field workshops** to sample multi-taxon and multi-scale biodiversity data of under-represented regions of the Palaearctic realm;
- **EDGG vegetation databases**;
- **Special Features** on grassland-related topics in various peer-reviewed journals.
- communication via the **EDGG Facebook group** (<https://www.facebook.com/groups/938367279561202>).
- communication via the **EDGG project in ResearchGate** (<http://bit.ly/2oqReOz> )

## EDGG Executive Committee and responsibilities of its members

### Didem Ambarlı

[didem.ambarli@gmail.com](mailto:didem.ambarli@gmail.com)

Editor-in-Chief of the Website; Deputy IAVS Representative and Treasurer; Deputy Conference Coordinator

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Membership Administrator; Deputy Editor-in-Chief of EDGG Bulletin; Deputy Field Workshop Coordinator; Deputy Editor-in-Chief of the Website

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Coordinator for Special Features; Field Workshop Coordinator; Deputy Editor-in-Chief of EDGG Bulletin

### Anna Kuzemko

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Editor-in-Chief of EDGG Bulletin; Facebook Group Administrator

### Péter Török

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IAVS Representative and Treasurer; Deputy Coordinator for Special Features

### Stephen Venn

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Secretary-General; Deputy Facebook Group Administrator

### Michael Vrahnakis

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Conference Coordinator



## New Editorial Board of the Bulletin constituted

Formerly the EDGG Bulletin was largely prepared by the members of the EDGG Executive Committee (EC), at best supported by one linguistic editor. While the feedback we receive generally suggests that the Bulletin is well liked by most EDGG members, it was evident that a further development, for example, towards more regular publication or more comprehensive coverage of grasslands across the whole Palaearctic realm as well as their diverse fauna and flora would only be possible if we involve more active EDGG members from outside the EC. Following our suggestion, the EC thus recently decided to enlarge the Editorial Board of the Bulletin. According to our Bylaws, the Editorial Board is a Special Committee, whose terms-of-duty end with those of the current EC, i.e. in

summer 2019, but if the Editorial Board is successful, the next EC probably will appoint a new Editorial Board.

In the near future, the Editorial Board members will hold one or two Skype meetings to discuss the future development of the journal and assign specific tasks to its individual members. In the next Bulletin, we plan to present you the Board members, their visions for the Bulletin and their tasks within the team as well as some other modifications in the publishing policy of our journal.

**Anna Kuzemko, Idoia Biurrun & Jürgen Dengler**



*Gagea peduncularis*, Bari, Italy.  
Photo: R. Labadessa.



*Romulea bulbocodium*, Alta Murgia, Italy. Photo: R. Labadessa.



*Iris pseudopumila*, Monopoli, Italy.  
Photo: R. Labadessa.



*Iris planifolia*, Andalusia, Spain. Photo: I. Dembicz.



*Pulsatilla patens*, Garching Heide, Germany. Photo: I. Dembicz.

**Announcement**

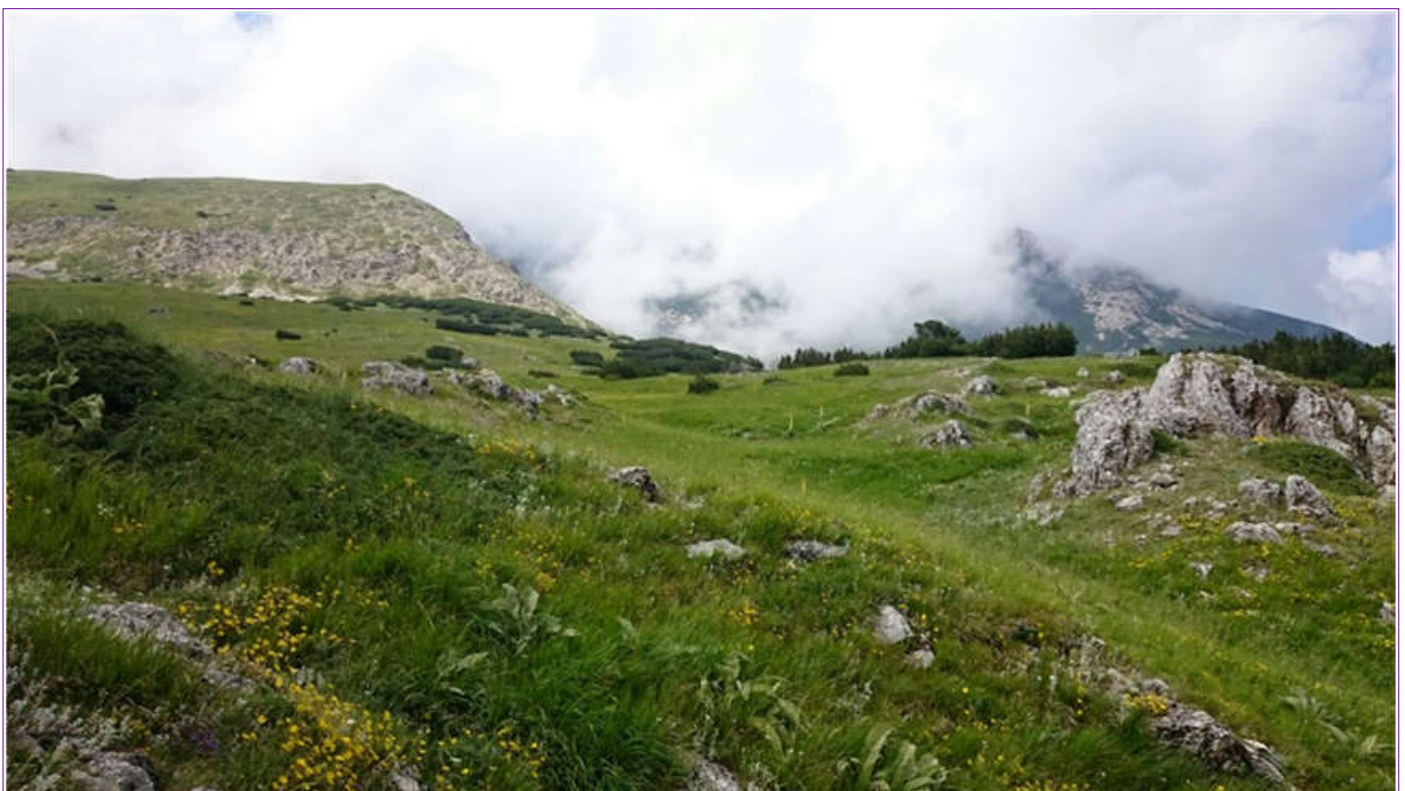
DOI: 10.21570/EDGG.Bull.36.4-11

# 15<sup>th</sup> Eurasian Grassland Conference

4–8 June 2018, Sulmona (Italy)

**COOPERATING FOR GRASSLAND CONSERVATION**

**Second call**

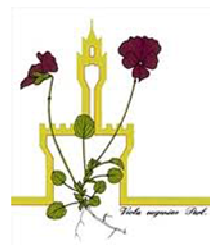


*Pian della Casa, Majella National Park. Photo: E. Giarrizzo.*



DIPARTIMENTO  
DI BIOLOGIA AMBIENTALE

**SAPIENZA**  
UNIVERSITÀ DI ROMA



**Società Botanica Italiana onlus**  
associazione scientifica fondata nel 1888



**Società Italiana di Scienza della  
Vegetazione**





## Main topic of the conference

### Cooperating for grasslands: from habitat interpretation to conservation measures

Grasslands are being addressed by a high number of projects aimed at conserving their biodiversity and the wide range of ecosystem services they provide. Still these projects are jeopardized by the challenges that derive from grasslands intrinsic features: the fine grain at which they should be analysed, the complexity that derives from their extraordinary biodiversity and variability, and their tendency to change rapidly in response to various natural and human drivers. Although local information is particularly important, a set of shared principles, methodologies and procedures would make the efforts to maintain grasslands across the Eurasian continent substantially more effective. The topic of the conference is therefore to address the main grassland conservation issues by establishing a basis for cooperation projects within the framework of the EDGG. The subtopics that are described below aim at stimulating exchange of local and national experiences that represent an example for effective cooperation projects.

## Subtopics

### 1. Habitat classification and indicators of conservation status

This session will cover grassland habitat classification, and the assessment of habitat conservation status by means of specific indicators. For habitat classification, a special emphasis will be given on the potential use of the large number of vegetation relevés stored in European and global databases. Similarly, special focus will be given on widely applicable approaches for the identification of appropriate indicators of habitat conservation status.

### 2. Grassland threats and pressures

Land abandonment, invasive alien species, and climate change are among several important threats to grassland habitats and species. However, how these threats change in relation to environmental conditions and land use legacies is still unclear. This gap in knowledge does not allow defining the practical steps that can be developed to increase resistance and resilience across the Eurasian continent. Large scale cooperation may represent a huge opportunity to assess threats through standardized monitoring and survey protocols, as well as to align a framework of threats and pressures for grassland habitats.

### 3. Conservation goals and appropriate measures

Grassland conservation projects focus on goals related to target species and habitats, but the effectiveness of conservation measures to achieve these goals is often a topic of debate. Conservation goals and measures should be integrated into wider society by positively engaging stakeholders, respecting cultures and the role of traditional knowledge, as well as the economic value of managing habitats and their ecosystem services. Conservation planning should therefore be framed in wider contexts and take into account other plans (such as forest plans, water management plans, park

plans, etc.). By comparing experiences and approaches with integrated management planning and stakeholder engagement, this session will indicate which factors should be considered to achieve good governance models.

### 4. Setting conservation priorities

Appropriate choice of priorities of sites/habitats to conserve or restore is essential in order to maximize the effort and money spent. Specific analyses should take into account how priorities can be different at different scales, and should therefore be addressed through a wide range of prioritization methodologies, from spatial analysis to a synthetic analysis of different habitats that will be addressed during this session.

### 5. Cooperating for grasslands

During the last session four working groups will address the four session subtopics to brainstorm transnational cooperation projects within the EDGG.

#### Open topics

Submission of abstracts on any other topic related to Palaearctic grasslands, their fauna, flora, ecology and conservation is possible, although such contributions do not have priority for the slots of the oral sessions.

## Preliminary time schedule

### June 4<sup>th</sup>

9:30 – 10:30	Registration
10:30 – 13:30	Workshop “Effective writing for international peer-reviewed journals”
13:30 – 14:30	Lunch break (registration will be possible)
14:30 – 18:00	Workshop on preparing proposals for LIFE+ and INTERREG
18:00 – 20:00	Welcome drink (registration will be possible)

### June 5<sup>th</sup>

9:00 – 9:30	Registration
09:30 – 10:00	Keynote lecture – Prof. Pietro Brandmayr “Carabid beetle assemblages in natural and seminatural grasslands of Italy: management and conservation”
10:00 – 12:30	Session 1 - Habitat classification and indicators of conservation status
12:30 – 13:30	Lunch
13:30 – 15:45	Session 2 - Grasslands threats and pressures
15.45 – 16.15	Coffee Break
16:15 – 19:00	Session 3 - Conservation goals and appropriate measures

### June 6<sup>th</sup>

08:00 – 18:30	Mid-conference excursion
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**June 7<sup>th</sup>**

- 09:00 – 09:30 Keynote lecture – Prof. Carlo Blasi “High mountain vegetation of the Apennines”
- 09:30 – 12:00 Session 4 - Setting conservation priorities
- 12:00 – 13:00 Lunch
- 13:00 – 14:00 Poster session
- 14:00 – 14:30 Transfer to National Park Operation Center
- 14:30 – 17:00 Session 5 - Cooperating for grasslands
- 17.00 – 17.30 Coffee Break
- 17:30 – 18:30 EDGG General Assembly
- 20:00 – 22:30 Grassland Party at the National Park Operation Center

**June 8<sup>th</sup>**

- 08:00 – 18:30 Post-conference excursion

**Important dates**

**Conference dates:** 4<sup>th</sup> – 8<sup>th</sup> June 2018

**Registration starts** at 26<sup>th</sup> February 2018

**Deadline for abstract submission** and application for travel grants: 18<sup>th</sup> March 2018

**Deadline for registration and payment:** 30<sup>th</sup> April 2018

**Keynotes speakers**

**Carlo Blasi** – Sapienza University of Rome



Carlo Blasi is Emeritus Professor in Plant Ecology at the Sapienza University of Rome. He is presently Scientific Director of the Interuniversity Research Centre on “Biodiversity, Ecosystem services and Sustainability (CIRBISES)” and President of the Foundation for the Italian Flora of the Italian Botanical Society. He is also

appointed member of the National Observatory on Biodiversity, of the Committee for the Development of Green Space, and of the Committee for Natural Capital, on behalf of the Ministry for the Environment, Land and Sea Protection. Finally, he is member of the National Commission for Forecasting and Preventing Great Risks, appointed by the Presidency of the Council of Ministers (Civil Protection Department). His research activities deal with plant ecology, plant sociology, biodiversity conservation, and territorial planning, with particular emphasis on ecological land classification, vegetation dynamics and conservation assessment. He is author of 400

publications, including 240 scientific papers and 40 book chapters.

You can visit his ResearchGate profile to learn more about Blasi’s work: [https://www.researchgate.net/profile/Carlo\\_Blasi](https://www.researchgate.net/profile/Carlo_Blasi)

**Pietro Brandmayr** – Università della Calabria



Pietro Brandmayr is Full Professor of Zoology at the Università of Calabria. His research interests range from taxonomy, with special reference to Carabid beetles, to insect ecology. His ecological research has focused on the impact of global change on species, animal communities, and ecosystems.

He investigated mainly alpine and Mediterranean environments. He is President of the Natural History Museum and of the Botanical Garden of the Università della Calabria, and he is also assigned by the title of Honoured Academic Member of the National Academy of Entomology.

You can visit his ResearchGate profile to learn more about Brandmayr’s works: [https://www.researchgate.net/profile/Pietro\\_Brandmayr](https://www.researchgate.net/profile/Pietro_Brandmayr)

**Venue**

The conference will take place in the Auditorium of the Annunziata, in the very heart of the town of Sulmona (25,000 inhabitants), a beautiful ancient town in the middle of Abruzzo region that was the native town of the famous Latin poet Ovid (Fig. 1).

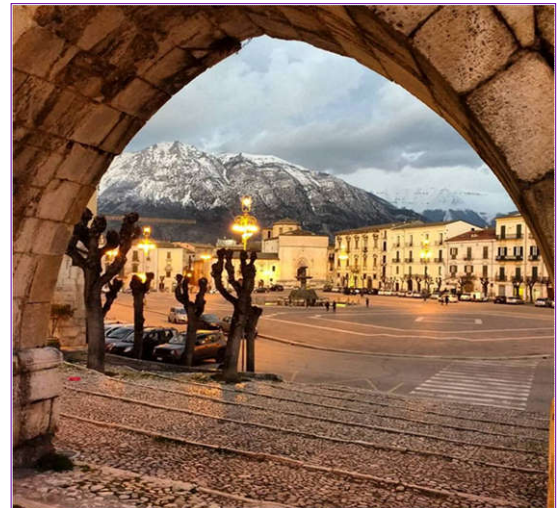
The town is located at an average altitude of 350 m a.s.l., in a wide basin, completely surrounded by high mountains and protected areas, that is called Valle Peligna, a plateau once occupied by a lake that disappeared in prehistoric times.

The center of the town is characterized by historic architecture with several important artistic monuments datable at Medieval or Renaissance periods, like the Cathedral, the aqueduct and the portal of St. Francesco della Scarpa’s church. The main square, Piazza Garibaldi, limited at one of its sides by a XIII century aqueduct, has a stunning view of Monte Morrone (2061 m a.s.l.), and it is one of the largest squares in Italy. It hosts important events and ceremonies and a traditional market on Wednesdays and Saturdays.

Sulmona is known for being the home of the Italian confectionery known as “confetti”, the traditional sugar-coated almonds.

The conference will be held in the “Annunziata” monastic complex and in headquarter of the Majella National Park Operation Center: the S. Spirito abbey. Both of them are the most famous and important monuments of the town. The first, with an unusual asymmetric façade, is composed by a





**Fig. 1.** Location of Sulmona and a view of Piazza Garibaldi and Monte Morrone at sunset. Photo: S. Landersz.

church and a palace built between the XIV and XVI centuries (Fig. 2). The second is the abbey founded around 1300 by the famous pope “Celestino V”, also known as Pietro da Morrone, mentioned in the Dante’s Comedy as “who made the great refusal”. The abbey had its maximum expansion in the XVI century and it is one of the widest abbeys in Italy.

### Registration and Fees (euros)

You can register and post your abstract at the web page of the conference at <http://edgg.org/egc2018>

#### Registration fees

##### IAVS Members

- 195 € Senior IAVS Members
- 155 € IAVS-member students and members under the age of 30

##### NON IAVS Members

- 215 € Senior non-IAVS Members
- 175 € Students (including PhD) and researchers under the age of 30

Registration fee covers attendance to the scientific sessions, coffee breaks and lunches between the sessions, grassland party, attendant pack, transport and lunch pack for the mid-conference excursion.

#### Fees of the optional events

- 20 € Pre-conference workshop “Effective writing for international peer-reviewed journals”
- 30 € Pre-conference workshop on preparing proposals for LIFE+ and INTERREG
- 30 € Post-conference excursion (includes transport and lunch pack)

#### Payment

All the payment should be made at the latest by **30<sup>th</sup> of April**.

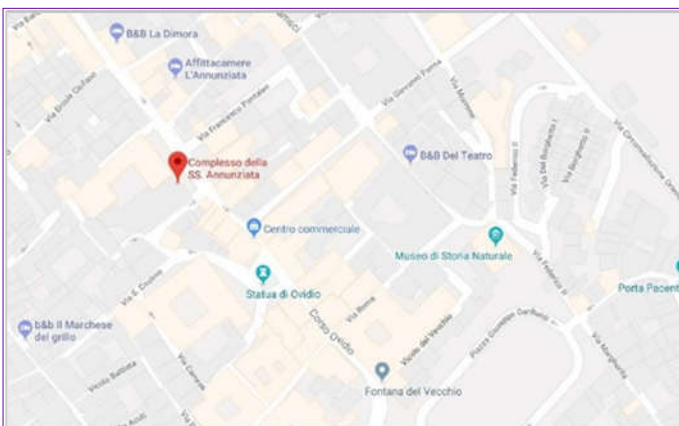
Fees should be paid to Società Botanica Italiana onlus by bank transfer

IBAN: IT 90K033 5901 6001 0000 0019 636.

Reason of the payment: EDGG Conference – name of the participant.

#### Cancellation and refund

70% of the fee will be refunded in case of cancellation up to one month before the conference only if no abstract was submitted. There will be the possibility to transfer the fee to a colleague up to a week before the conference.



**Fig. 2.** The complex of Annunziata where the plenary sessions will take place.

### Excursions (Fig. 3)

The Majella National Park is one of the three national parks in the Abruzzi region, Central Apennines. Its flora is very rich, counting over 2150 species and subspecies of vascular plants. The Park has a high relevance for plant sciences and biogeography: over 50 entities have their *locus classicus* there; 174 taxa are endemic of Italy and five of them are exclusive of the National Park area.

The territory is mainly mountainous, and, similarly to other mountain areas in Central Italy, it was exploited in the past, both for timber production and for agriculture. Nowadays, the population living in the mountain is less numerous, and consequently, the landscape is changing. For example, in the sites of the excursion we will be able to see secondary pastures spread on ancient crops, witnesses of which are represented by stone heaps derived by clearance operations, dry stone walls, stone huts and some plant species typical of abandoned fields. These secondary pastures are subjected today to secondary succession, being invaded by herb and shrub species that indicate this ongoing process. Luckily, in the Majella National Park, differently from other areas, alien species do not play an important role in this process. The grazing itself is changed: once almost exclusively made by sheep and goats, today the great majority of grazing animals are cattle and horses. The structure and the composition of the pasture are involved with deterioration evidences in the sites where the animals stay for a long time. Surveying the pastures, it is possible to observe different ancient and actual processes whose government is the current challenge to maintain high levels of biodiversity. Many historic evidences of human presence occur within this mountainous area, the more evocative being the plenty of hermitages within the Park. We will visit one of the more suggestive of them in the mid-conference excursion: the S. Bartolomeo hermitage.

#### Practical advices to participants about the excursions

For both the excursions, the participants are recommended to wear different layers of clothes because the temperature could be very variable. A waterproof cover and comfortable



**Fig. 3.** Locations of the conference excursions.

shoes are strongly recommended. The participants are invited not to collect plants, animals or stones, because it is not allowed. If someone wants to do it for scientific purpose, a specific request must be submitted to the Majella National Park administration.

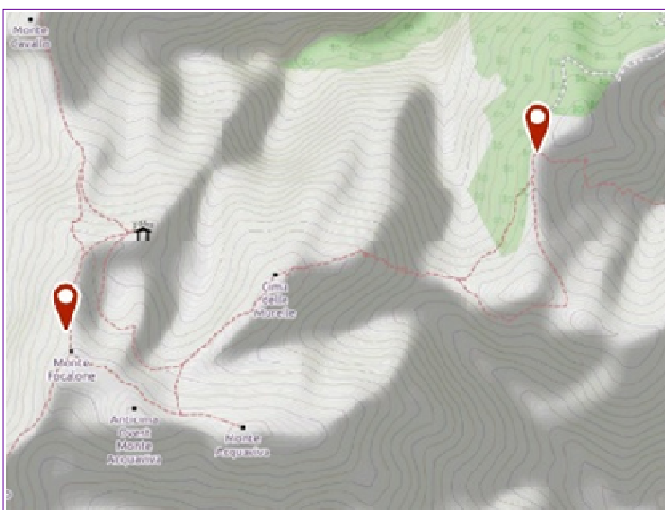
In the areas corresponding to the “A zone” of the Park (strict reserve), the participants are invited to walk only in the indicated paths or in those that will be indicated by the guides during the excursions.

#### Mid-conference excursion – 6<sup>th</sup> June

The excursion will take place from S. Bartolomeo Hermitage to Rifugio Pomilio. It will be divided in three parts (Fig. 4):

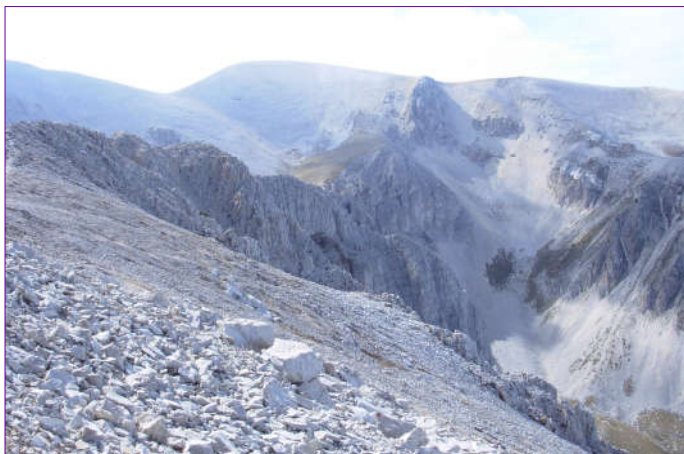
1. S. Bartolomeo Hermitage at 610 m a.s.l., embedded in the rock in a context of dry grasslands (*Bromopsis erecta*, *Brachypodium rupestre*, *Trachynia distachya*), cultivated and uncultivated fields, thermophilous deciduous shrubs;
2. From Stazzo di Roccamorice to La Maielletta (1450-1670 m a.s.l.), through *Bromopsis erecta*, *Festuca circummediterranea* and *Brachypodium genuense* grasslands;
3. Rifugio Pomilio (2000 m a.s.l.), among the shrubs of *Pinus mugo*, at the southern limit of its distribution area, and with a wonderful view on the Murelle glacial amphitheater (Fig. 5).

Mountain shoes and clothes, hat and sunscreen will be necessary.



**Fig. 4.** Itinerary of the mid-conference excursion.





**Fig. 5.** Anfiteatro delle Murelle (one of the mid-stops of the Mid-conference excursion). Photo: A. Guerri.



**Fig. 7.** A view from the slope towards Tavola Rotonda. Photo: G. Ciaschetti.

### Post-conference excursion – 8<sup>th</sup> June

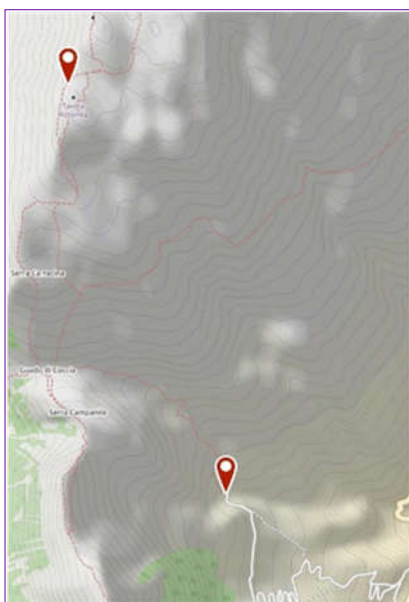
(optional - max number of participants: 90)

From Sant'Antonio (Palena) towards Tavola Rotonda (Fig. 6, 7)

The excursion will cover a great altitudinal range from about 1000 m a.s.l. to about 2000 m a.s.l. Along the footpath it will be possible to see the secondary grasslands of the montane belt (dominated by *Bromopsis erecta* and *Sesleria juncifolia*), and the subalpine dwarf shrublands dominated by *Arcostaphylos uva-ursi* and *Juniperus communis* var. *saxatilis*. Finally, we will reach the alpine belt, with primary grasslands dominated by *Festuca violacea* subsp. *italica*, and scattered examples of alpine vegetation.

During this excursion, EDGG Co-chair Jürgen Dengler will demonstrate to interested participants how to collect the standardised multi-scale and multi-taxon EDGG Biodiversity Plots (see Dengler et al. 2016, *Bull. Eurasian Dry Grassl. Group*

32: 13–30). This can be interesting both for potential future hosts and participants of the annual EDGG Field Workshops and for colleagues who want to learn this method for their own research. Depending on the number of interested colleagues, we will sample one or several complete EDGG Biodiversity Plots from high-elevation grasslands, which will be fed into the EDGG database “GrassPlot”



**Fig. 6.** Itinerary of the post-conference excursion.

(<http://bit.ly/2HvVkgu>). If interested, please contact J. Dengler in advance ([juergen.dengler@uni-bayreuth.de](mailto:juergen.dengler@uni-bayreuth.de)).

Mountain boots and clothes, hat and sunscreen will be necessary.

### Workshops (optional)

#### Technical workshop “Effective writing for international peer-reviewed journals”

For many researchers from more traditional scientific cultures, writing manuscripts for peer-reviewed international journals remains challenging. In this workshop you will learn that writing successful manuscripts (in the sense that they are accepted in the intended journal and get many citations) has nothing to do with witchcraft, but a lot with techniques – which can be learned.

The workshop will introduce you to the IMRaD (Introduction, Methods, Results and Discussion) structure of standard research papers and showcase the key aspects that make up good Introduction, Methods, Results and Discussion sections. You will learn how to optimize the presentation of results through a wise combination of figures, tables, appendices and text. We will deal with formal aspects of citing and listing references. You will also learn how to write an effective Abstract and how cleverly selected titles and keywords can contribute to the success of your article. As the majority of participants likely will not have English as their mother tongue, we will also briefly address the appropriate style when writing a scientific article in English.

If time allows, there is the option to provide some insights into the peer-review process, the meanings of bibliometric indices or how to find appropriate journals for manuscripts. The course will consist of lectures, interactive and practical parts. The program is flexible and can be adjusted spontaneously to the needs and wishes of participants. In addition to the three-hour class, the lecturer is also available for individual coaching of participants in the afternoon on the basis of concrete writing problems and manuscript drafts they bring with them. If you are interested in this, please indicate this

with your registration, including a short summary of the problem you have/support you wish.

**Tutor: Jürgen Dengler** is Professor of Vegetation Ecology at the Zurich University of Applied Sciences (ZHAW) in Switzerland and co-founder of EDGG. He is chief editor of *Phytocoenologia*, member of the editorial boards of *Applied Vegetation Science* and *Tuexenia* and has led the guest editor teams of about 20 Special Issues/Special Features in various international journals (*Agriculture, Ecosystems and Environment*; *Journal of Vegetation Science*; *Biodiversity and Conservation*; ...). He authored 250 scientific publications, including 73 papers in the Web of Science, and has extensive experience in teaching the art of scientific writing.

#### **Technical workshop on preparing proposals for LIFE+ and INTERREG**

In order to facilitate the work of the participants in establishing new connections and potential cooperation projects the workshop will introduce some funding possibilities, with special reference to the EU but with the possibility of involving other countries. The workshop will focus on LIFE+ and INTERREG programmes.

The LIFE Programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. The 'Environment' strand of the new programme covers three priority areas: environment and resource efficiency, nature and biodiversity and environmental governance and information. The 'Climate Action' strand covers climate change mitigation; climate change adaptation; and climate governance and information.

Interreg Europe helps regional and local governments across Europe to develop and deliver better policy. By creating an environment and opportunities for sharing solutions, Interreg Europe aims to ensure that government investment, innovation and implementation efforts all lead to integrated and sustainable impact for people and place. The programme supports actions in four different thematic categories: 1) Research, technological development and innovation, 2) Competitiveness of SMEs, 3) Low-carbon economy, 4) Environment and resource efficiency, and all the actions financed by Interreg Europe have the objective of promoting a smart, sustainable and inclusive growth.

Proposal preparation will be explained and practical examples of successful proposals will be described.

**Tutors:** Tutors are from PROGEU - Progress in European Union.

**Mattia Angelini** - Master's Degree in Political Science obtained from "Sapienza University of Rome". Junior Project Manager since June 2017 at PROGEU - Progress in European Union. He is responsible for the digital communication area and for the evaluation and the development of project proposals for public bodies, SMEs and NGOs.

**Lorenzo Carrozza** - is an environmental policy expert and consultant. He graduated from "Sapienza University of Rome" in "Innovation and Development". Since 2013, he is policy consultant for the Environment Commission of the Italian Parliament. He collaborates with several authorities, NGOs and private sector for the implementation of projects supported by the European Commission. He also runs courses on Development Cooperation, Climate Change and Environmental Studies.

#### **Accommodation**

Each participant should book it independently. Sulmona hosts several hotels and bed and breakfast that are advertised on popular hotel search engine, and a list of the principal structures is available at the download section in the conference webpage.

#### **Traveling**

The city may be reached by train or bus from Rome or Pescara. Both these cities host international airports. Please see the travel information document at the download section in the conference webpage for details.

Italy is part of the Schengen area, therefore all the citizens from one of those Schengen countries are allowed to visit Italy without visas. However, if you are from a non-EU country, you can check if you need visa to visit Italy at <http://vistoperitalia.esteri.it/home/en#BMQuestionario>. In case you need an invitation, please refer to the contact persons.

#### **Grants**

Thanks to our supporter (IAVS), we can offer a limited number of travel grants to attend the EGC (partial or full coverage of travel costs and conference fee). To qualify, active participation at the conference (oral presentation or poster) is required and priority will be given to young scientists with financial constraints (i.e. low income and/or of particularly high costs to get to Sulmona).

If you wish to apply for financial support, you first need to register yourself and the abstract of your contribution and provide the necessary information for travel grant application including a motivation letter. **Applicants must be IAVS members** (membership can be obtained at low rates and in many cases even for free at [http://www.iavs.org/Membership\\_Renew.aspx](http://www.iavs.org/Membership_Renew.aspx), <http://www.iavs.org/AwardsFinancial.aspx>). In both cases, applications will only be considered when the criteria are met and the required information is provided completely.

#### **Conference publications**

As in previous years, there will be Special Features (SFs) with selected contributions from the conference in international, peer-reviewed journals, guest-edited by EDGG members. Notably, a Special Feature in *Tuexenia* 2019 and a Special Feature in *Hacquetia* 2019 have already been approved.



### Young Investigator Prizes

As in previous years, prizes will be awarded to young scientists for excellent presentation of their research (talk or in poster form). For these purposes, young scientists (less than 35 years old) will be asked during registration if they wish to participate in the contest.

### Organizers

Besides the EDGG, the conference will be organized by the Department of Environmental Biology – Sapienza University of Rome, and by the Majella National Park with the support of the Società Botanica Italiana.

**Eurasian Dry Grassland Group (EDGG)** ([www.edgg.org](http://www.edgg.org)) was established in August 2008. It is an official working group (1049 members) of the International Association for Vegetation Science (IAVS, [www.iavs.org](http://www.iavs.org)), though it deals both with animals and with plants. Its basic aims are to compile and to distribute information on research and conservation in grasslands beyond national borders, and to stimulate active cooperation among scientists, NGO's and all who work with or are interested in grasslands.

**Sapienza University of Rome** was founded in 1303 by Pope Boniface VIII, is one of the oldest universities in the world. With over 111,000 students, 4000 teachers and 2000 employees, technicians and librarians, in addition to 2000 administrative staff in university hospitals, Sapienza is the largest university in Europe. Its mission is to contribute to the development of a knowledge society through research, excellence, quality education and international cooperation. The Department of Environmental Biology (DBA) was founded in 2010 after a re-organization of the Departments of Biology of Sapienza. The Department focuses on research and teaching of the biology and ecology of various taxonomic groups ranging from algae and fungi, to plants, animals and man.

**Majella National Park** was founded in 1991. The park has an extent of about 75,000 hectares and it is completely occupied by mountains. Majella is known as the Mother Mountain of Abruzzi and it is located in the most remote and wildest area of central Apennine. This area is also called the Holy Mountain because of many sites that have always inspired profound religiousness and hermitage. The Park is notable for its vast plateaus at high altitudes and for the wild and imposing canyons, but also for its Abbeys, and wonderful old towns.

**Società Botanica Italiana onlus** was founded in Florence in 1888. Its origin derives from the Società Botanica Fiorentina, the oldest botanical association in Europe (founded in 1716). Today the Society has about 1300 members that carry out a wealth of activities, from courses and excursions to conferences and publications with the ultimate goal of promoting the advance and dissemination of botanical culture and sciences and of their various applications.

### Supporting organisations / institutions

**International Association for Vegetation Science (IAVS, [www.iavs.org](http://www.iavs.org))**: its original precursor was the International Phytosociological Society (IPS), which was founded in 1939. IAVS is a worldwide union of scientists and others interested in theoretical and practical studies of all aspects of vegetation. The main goals of the IAVS are to facilitate personal contacts among vegetation scientists all over the world and to promote research in all aspects of vegetation science and its applications.

**John Wiley & Sons, Inc.** (<http://eu.wiley.com/WileyCDA/>) was founded in 1807. It aspires to be a valued and respected provider of products and services that make important contributions to advances in knowledge and understanding, a role that is essential to progress in a healthy and prosperous society. Wiley's mission is to provide must-have content and services to professionals, scientists, educators, students, lifelong learners, and consumers worldwide.

**Società Italiana di Scienza della Vegetazione** was founded in 2006 as a continuation of the Società di Fitosociologia (S.I.Fs.) that was founded already in 1964 as an idea of a group of researchers led by Valerio Giacomini, who was the first president of the society. The aim of the society is to promote research on vegetation, also through national and international networking, and to support people and institutions with an interest in the conservation of vegetation.

### Conference homepage

<http://edgg.org/egc2018>

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**Announcement**

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# Invitation and guide

## to the 11<sup>th</sup> EDGG Field Workshop

### **GRASSLANDS OF INNERALPINE DRY VALLEYS:**

### ***part 1, Eastern Alps***

### **Austria, 6–13 July 2018**

#### Background

EDGG Field Workshops have the main aim of collecting high-quality data on composition and biodiversity patterns of grasslands in understudied regions of the Palaearctic. The destinations of the former expeditions during the period 2009–2017 were Romania (Dengler et al. 2009; Turtureanu et al. 2014), Ukraine (Dengler et al. 2010; Kuzemko et al. 2014; Kuzemko et al. 2016), Bulgaria (Apostolova et al. 2011; Pedashenko et al. 2013), Sicily (Guarino et al. 2012), Greece (Dengler & Demina 2012), Khakassia (Janišová et al. 2013; Polyakova et al. 2016), Spain (Biurrun et al. 2014), Poland (Kącki et al. 2014), Serbia (Ačić et al. 2017) and Italy (Filibeck et al. 2018, this issue). The method of data sampling, first proposed by Dengler (2009), has been revised and improved during the last 10 expeditions and recently described in detail (Dengler et al. 2016a). Besides the sampling of high-quality datasets, also the exchange of knowledge between participants from different countries and with diverse scientific interests and backgrounds is an important aim of the EDGG Field Workshops. Data collected in 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 a comparative overview on mean and maximum richness values of Palaearctic grasslands (Dengler et al. 2016b). Recently, also various animal taxa, including spiders (Kastrygina et al. 2016), grasshoppers (see Dengler et al. 2016a) and leafhoppers (Filibeck et al. 2018) have been collected on the same plots to allow multi-taxon studies even beyond the original three groups (vascular plants, bryophytes, lichens). To facilitate the broad scientific utilization of the multi-scale vegetation plot data from EDGG Field Workshops, all of them are fed into the “GrassPlot” database of EDGG (Janišová et al. 2017; <http://bit.ly/2qKTQt2>). Finally, providing recent plot data from grasslands in regions underrepresented in the European Vegetation Archive (EVA; Chytrý et al. 2016) via the national plot databases (e.g. Willner et al. 2012) to EVA could enhance the reliability and spatial coverage of future broad-scale classifications of grass-

lands in Europe such as Schaminée et al. (2016) and Willner et al. (2017).

In this guide, the nomenclature follows Fischer et al. (2008) for vascular plants, Frahm & Frey (2004) for bryophytes and Hafellner & Türk (2016) for lichens.

#### 11<sup>th</sup> EDGG Field Workshop in Austria

Following an initial study of vascular plant diversity in the area of the Aosta valley (Wiesner et al. 2015), one of the driest regions of the inneralpine valleys, the authors came up with the idea to start a systematic investigation of the grassland vegetation of the inneralpine dry valleys as a whole. This has been the subject of the seminal work by Braun-Blanquet (1961), more than half a century ago. Since then only few, mostly regional or local studies on the grassland vegetation of these continental valleys have been published. Some more recent works on vegetation complexes of the inneralpine dry valleys (Schwabe & Kratochwil 2004, 2012), although rich in information, do not include the easternmost branches of the Styrian Mur Valley and East Tyrol. Better, more consistent and more recent information on the dry grassland vegetation of these valleys is needed for several purposes: (1) Good data on biodiversity patterns along the steep climatic, edaphic and elevational gradients available here would enrich our understanding of drivers of grassland diversity at European scale; (2) While currently grassland data from the inneralpine valleys are largely missing in EVA (Chytrý et al. 2016), they would actually be needed for solving several intricate syntaxonomic challenges – because the Alps mark the borders between several higher-rank syntaxa from east to west as well as north to south, while some are currently even assumed to be endemic (e.g. *Stipo-Poion xerophilae*), but with unclear concept and delimitation; (3) Last but not least, the inneralpine dry grasslands also have high conservation priority, but it is likely that spatial extent and quality have much decreased since the times of Braun-Blanquet (1961). We thus decided to start a series of “resurvey” expeditions “on the steps of Josias Braun-Blanquet”, but with modern methodology (Dengler et al. 2016a), starting with the Austrian Alps, where the climate is



not as arid (especially in summer) as in the valleys of the southwestern Alps (see section “Study area”).

The field workshop will be organized by Martin Magnes, Helmut Mayrhofer (both University of Graz, Institute of Plant Sciences) and Philipp Kirschner (University of Innsbruck, Nature Park Kaunergrat), supported by Heribert Köckinger, Peter Hochleitner (local experts on the Mur Valley) and Oliver Stöhr (local expert on Eastern-Tyrol). As one of the organizers (H. Mayrhofer) is a lichenologist with profound knowledge of lichens in the inneralpine dry valleys, we will have the chance to become acquainted also with critical lichen species and to get an introduction to lichenology during the evenings (see the section “Lichens of dry grasslands in Austria”). It is intended to use the data collected during the workshop for one or several joint publications on phytosociology and syntaxonomy of these grasslands. Later the data will be provided to the Austrian Vegetation Database (Willner et al. 2012) and the EDGG database of multi-scale data, “GrassPlot” (Janišová et al. 2017).

### How to register:

There will be **16 places** available (in addition to the organizers). Interested participants from any country and any academic level who would like to collaborate on the data sampling are welcome. Beyond **botanists (including specialists in bryophytes and lichens)**, we would be particularly glad if **zoologists and microbiologists** join to complement our multi-taxon sampling, for example, with data on **grasshoppers, leafhoppers, spiders, snails** or **soil-dwelling fungi** or **bacteria**. Any other taxonomic group that could reasonably be sampled with a once-off approach is welcome – to discuss options, please contact the local organisers and Jürgen Dengler.

The **workshop fee** includes accommodation (sharing twin rooms), full meals (including dinner on the first day and breakfast and lunch on the last day) and transport from and to Graz airport or Graz central station. The calculated fees are (in case with 18 participants)

- 680€ for postdocs (senior scientists, professors etc.) who are not members of IAVS
- 640 € for postdocs (senior scientists, professors etc.) who are members of IAVS
- 600 € for young scientists (master and PhD students) as well as unemployed persons who are not member of IAVS
- 560 € for young scientists (master and PhD students) as well as unemployed persons who are member of IAVS

The exact prices (which probably will be slightly lower) will be confirmed in due course to those who pre-register.

**Deadline of application is 31 March 2018.** The formal application should be sent via e-mail to Martin Magnes ([martin.magnes@uni-graz.at](mailto:martin.magnes@uni-graz.at)) and Jürgen Dengler ([juergen.dengler@uni-bayreuth-de](mailto:juergen.dengler@uni-bayreuth-de)) with “EDGG Field Workshop 2018” in the subject line. Please provide the following personal information: full name, gender, age, academic degree/position, affiliation, e-mail and post address, and list the

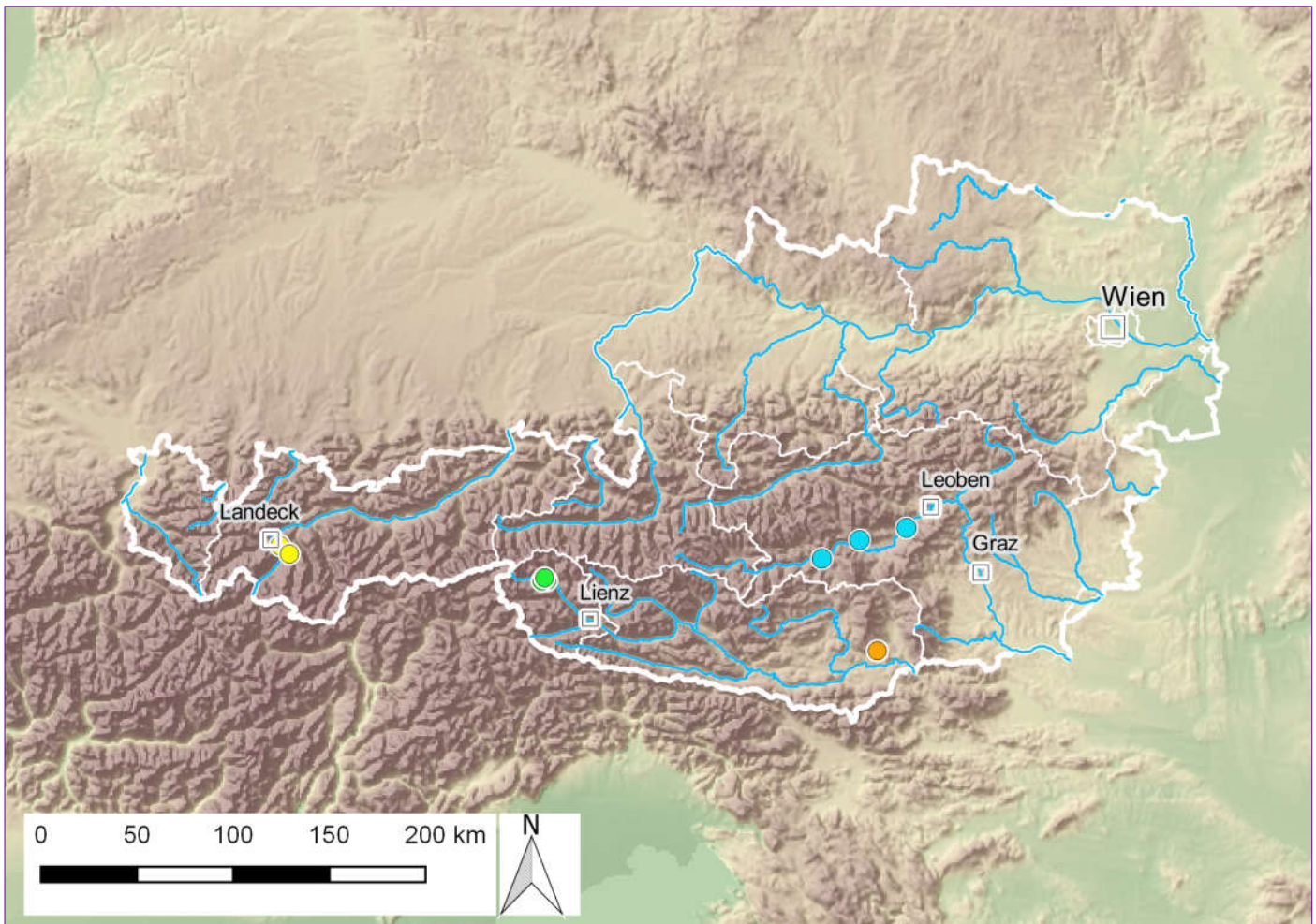
previous EDGG expeditions you have already participated in. Important: please indicate in your application if you have any special dietary requirements. Those who are participating for the first time in an EDGG Field Workshop, are kindly asked to attach a short motivation letter, stating your interests and competences and explaining why you wish to participate in the workshop and how you would contribute to its success (we would particularly appreciate specialists for bryophytes, critical vascular plants and zoologists/microbiologists who are willing and able to sample other taxonomic groups on the same plots used for the vegetation studies). If the number of applicants exceeds 16, we reserve the right to select based on the provided information. If you have any questions prior to your application, do not hesitate to contact the two mentioned persons.

With your registration, you can also apply for an **IAVS travel grant** that can cover part of your workshop fee and/or travel costs (deadline also 31 March 2018). To be eligible, you need to be a membership of IAVS in 2018 (note that for many countries, free or reduced membership is available (see <http://iavs.org/Membership/Financial-Support.aspx>) and to give a presentation during the Field Workshop. To apply for a travel grant, please submit a text document entitled “Application for IAVS travel grant” which, in addition to the information required for all participants, includes the following information:

- your name;
- title of your presentation (presentations on sampling methods in or biodiversity patterns of grasslands are preferred as well as introductions to potential future venues of Field Workshops);
- confirmation that you are IAVS member in 2018;
- estimated costs of travel to and from Graz;
- information on whether you receive other funding;
- whether your participation is only possible with financial support; and
- whether you are also applying for financial support to attend the 2018 EDGG conference in Italy, the 2018 EVS workshop in Poland or the 2018 IAVS Symposium in the U.S.A. (you can normally receive financial support for only one of these meetings and therefore have to indicate your preference). The decision on the award of travel grants and the amount of money given to each of them is made by the EDGG Executive Committee in consultation with the IAVS Global Sponsorship Committee. Applicants will be notified about the decision by approx. 15 April 2018.

### Itinerary for the 11<sup>th</sup> EDGG Field Workshop in Austria

**July 6:** meeting the group at 13:00 at Graz airport (or those who will arrive by train at 14:00 at Graz Central Station). Transfer via minibus to Kraubath. Fieldwork in the famous serpentinite steppes of the Gulsen. Transfer to Neumarkt in der Steiermark, hotel check-in. After dinner, presentation about the study area.



**Fig. 1.** Study area with positions of fieldwork sites mentioned in the itinerary and the main rivers. Styria (blue): Mur Valley, from East to West: Gulsen, Pöls, Puxer Wand; East Tyrol (green): Virgen Valley; Tyrol (yellow): Upper Inn Valley, Kauns and Fließ; Carinthia (orange): Griffen (© European Environment Agency EEA).

**July 7:** fieldwork at semi-dry grasslands and rock-outcrops near Pöls, in the afternoon rocky grasslands at the “Puxer Loch” N of Teufenbach. Overnight at Neumarkt.

**July 8:** transfer to the village Virgen in East Tyrol. Hotel check-in and possibly fieldwork at the ruin of Rabenstein N of Melnitz, night in Virgen.

**July 9:** fieldwork in semi-dry hay meadows in Marin (ca. 1450 m a.s.l.) NE of Virgen. During the afternoon, fieldwork on alpine hay meadows on the SE slope of the Zinizachspitze (1950 m a.s.l.). Late afternoon fieldwork at the castle hill of Obermauern (1390 m a.s.l.), night in Virgen.

**July 10:** transfer to the Upper Inn Valley to Fließ, hotel check-in (Kauns), possibly start of the fieldwork on dry grassland in Kauns. After dinner, keynote lecture about management of the dry grasslands in the villages Fließ and Kauns by Ernst Partl, director of the Nature Park Kaunergrat.

**July 11:** fieldwork in the “Fließer Sonnenhänge”, night in Kauns.

**July 12:** transfer to Carinthia to the Turner Lake, south of Klöppel, hotel check-in.

**July 13:** after breakfast fieldwork at the castle hill of Griffen, then transfer to Graz airport (13:00) and Graz Central Station (14:00).

### The study area (Fig. 1)

The inneralpine dry valleys of the Eastern Alps are not as arid as the valleys in the Western Alps, which are in the rain shadow of the major mountain systems of the Alps and additionally influenced by the Mediterranean climate (Braun-Blanquet 1961). Even the driest Eastern Alpine area, the “Vintschgau”, in the upper Adige valley (e.g. Schlanders, 496 mm annual precipitation and mean annual temperature 9.6° C) does not have a summer drought. In our investigation area, there is a gradient of decreasing precipitation from East Tyrol to the Mur Valley and finally to the Upper Inn Valley (Fig. 2). Even in the driest part of our study area, in the Upper Inn Valley, we can find dry grasslands only on steep southern slopes with shallow soils. Actually in these exposed places, grasslands depend on human utilization. The climatic gradient is perceptible in the regional vegetation: in the Upper Inn Valley we can find Inneralpine Pine Woods (*Ononido rotundifoliae-Pinetum sylvestris*, Eichberger et al. 2007) up to the



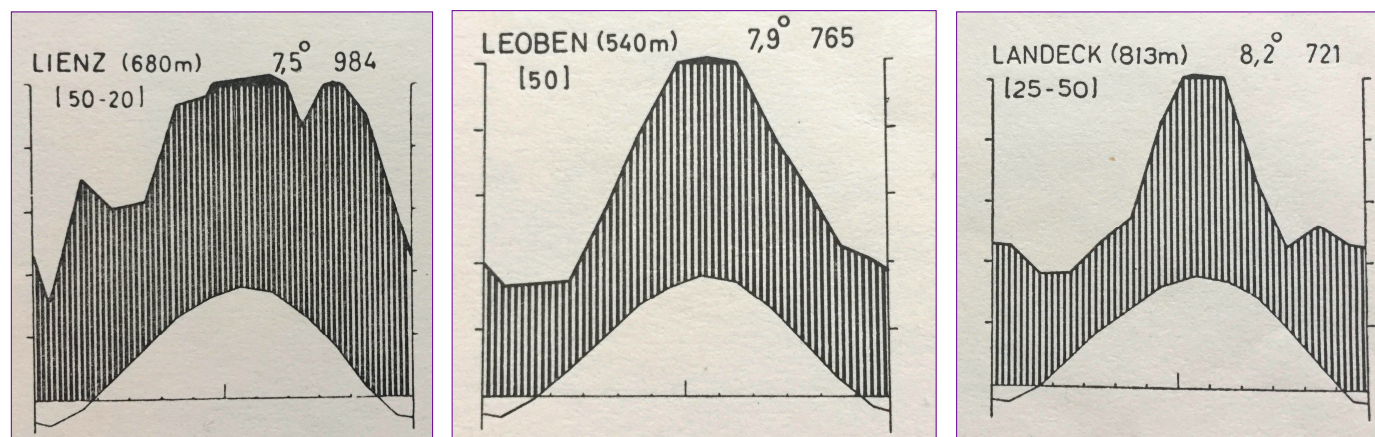


Fig. 2. Climatograms (Walter & Lieth 1967): Lienz (East Tyrol), Leoben (Mur Valley), Landeck (Upper Inn Valley).

montane zone, in the Mur Valley the *Erico-Pinetum sylvestris* on serpentinite and limestone and in the Virgen Valley associations of the *Piceetalia*. In the southern part of Carinthia, more precisely in the "Klagenfurter Basin", associations of the *Fagion sylvaticae* are common and dry grasslands are restricted to steep, southfacing rockslopes (Wagner 1989).

### Synopsis of expected associations in the study area

Syntaxonomy and nomenclature follow Mucina et al. (2016) for higher-rank syntaxa and Grabherr et al. (1993), Mucina (1993) and Mucina & Kolbek (1993a,b) for associations.

#### *Asplenietea trichomanis* (Br.-Bl. in Meier & Br.-Bl. 1934) Oberd. 1977

*Asplenietalia septentrionali-cuneifolii* Mucina in Mucina & Theurillat 2015

*Asplenion serpentini* Br.-Bl. & Tx. ex Eggler 1955

*Notholaeno-Sempervivetum hirti* Br.-Bl. 1961

#### *Elyno-Seslerietea* Br.-Bl. 1948

*Seslerietalia caeruleae* Br.-Bl. in Br.-Bl. & Jenny 1926

*Caricion ferrugineae* G. Br.-Bl. & Br.-Bl. in Br.-Bl. 1931

*Campanulo scheuchzeri-Festucetum noricae* Isda 1986

#### *Festuco-Brometea* Br.-Bl. & Tx ex Soó 1947

*Brachypodietalia pinnati* Korneck 1974

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

*Asperulo tinctoriae-Brachypodietum rupestris* Franz in Mucina & Kolbek 1993

*Festucetalia valesiacae* Soó 1947

*Festucion valesiacae* Klika 1931

*Potentillo puberulae-Festucetum sulcatae* Br.-Bl. 1961

*Stipo-Poion xerophilae* Br.-Bl. & Richard 1950

*Astragalo-Brometum* Br.-Bl. ex Kielhauser 1954

*Achnathero-Stipetum capillatae* (Br.-Bl. ex Kielhauser 1954) Mucina 1993

*Agropyro dumetori-Artemisietum absinthii* Br.-Bl. ex Kielhauser 1954

*Teucrio-Caricetum humilis* Br.-Bl. 1961

*Gentiano cruciatae-Centaureetum alpestris* Br.-Bl. 1976

*Stipo pulcherrimae-Festucetalia pallentis* Pop 1968

*Diantho lumnitzeri-Seslerion* (Soó 1971) Chytrý & Mucina in Mucina & Kolbek 1993

*Seselietum austriaci* Br.-Bl. 1961

*Koelerio pyramidatae-Teucrietum montani* Franz in Mucina & Kolbek 1993

*Asplenio-Festucion pallentis* Zólyomi 1936 corr. 1966

*Armerio-Potentilletum arenariae* Br.-Bl. 1961

#### *Sedo-Scleranthetea* Br.-Bl. 1955

*Sedo-Scleranthetalia* Br.-Bl. 1955

*Sedo-Scleranthion* Br.-Bl. & Richard 1950

*Sclerantho-Sempervivetum arachnoidei* Br. Bl. 1955

### Lichens of dry grasslands in Austria with a special emphasis to the Virgen Valley in East Tyrol (Helmut Mayrhofer)

The grasslands of the dry valleys of the Central Eastern Alps host lichen biota dominated by saxicolous species on south-facing slopes. The terricolous lichens are represented by less species. Muscicolous species, including some that only occur on bryophytes and others growing also on compact soil or rocks, may also occur. The former extensive dry grasslands on the south-facing slopes west of the village Obermauern in the Virgen Valley, have been overgrown by low forests in recent times and only very few open patches remain. The following species list is based on the investigation of the area by Buschardt (1979) and Mayrhofer & Poelt (1979) in the 1970s. Due to the habitat change, especially within the last twenty years, the actual plant diversity might become much lower but several of the recorded species may also be present at other sites to be visited during the field workshop. The Virgen Valley sites with calcareous mica schist show an interesting mixture of xerothermic and alpine species.

#### Species lists:

Abbreviations for ecoclimatological elements: u (ubiquists), t (temperate), a (subalpine and alpine), mx (Mediterranean-xerothermic), kx (continental-xerothermic)

#### saxicolous species

*Acarospora cervina* – u

*Caloplaca cirrochroa* – t

*Caloplaca conversa* – a



**Photo 1.** Gulsen, southern slopes. Photo: M. Magnes.



**Photo 2.** *Armerio-Potentilletum arenariae*, Gulsen. Photo: M. Magnes.

*Caloplaca dolomitica* – t  
*Caloplaca irrubescens* – mx  
*Dimelaena oreina* – a  
*Lecanora argopholis* – kx  
*Lecanora valesiaca* – kx  
*Lecidea paratropoides* – kx  
*Lecidea tessellata* – a  
*Lecidella patavina* – a  
*Lecidella stigmatea* – u  
*Lobothallia alphoplaca* – kx  
*Lobothallia prae-radiosa* – kx  
*Lobothallia radiosa* – t  
*Monerolechia badia* – t  
*Phaeophyscia cernohorskyi* – mx  
*Phaeophyscia hispidula* – mx  
*Phaeophyscia sciastra* – u  
*Physcia caesia* – u  
*Physcia dimidiata* – kx  
*Physcia subalbinea* – kx  
*Physconia grisea* – u  
*Physconia petraea* – mx  
*Protoparmeliopsis garovagloi* – mx  
*Psora globifera* – a

*Rhizocarpon disporum* – t  
*Rhizoplaca chrysoleuca* – a  
*Rinodina bischoffii* – u  
*Rinodina lecanorina* – mx  
*Rinodina luridata* – mx  
*Rinodina milvina* – a  
*Toninia alutacea* – a  
*Toninia candida* – a-mx  
*Toninia cinereovirens* – mx  
*Toninia toniniana* – mx  
*Xanthoparmelia conspersa* – t-x  
*Xanthoparmelia pulla* – t-x  
*Xanthoparmelia stenophylla* – t-x  
*Xanthoparmelia verruculifera* – t-x

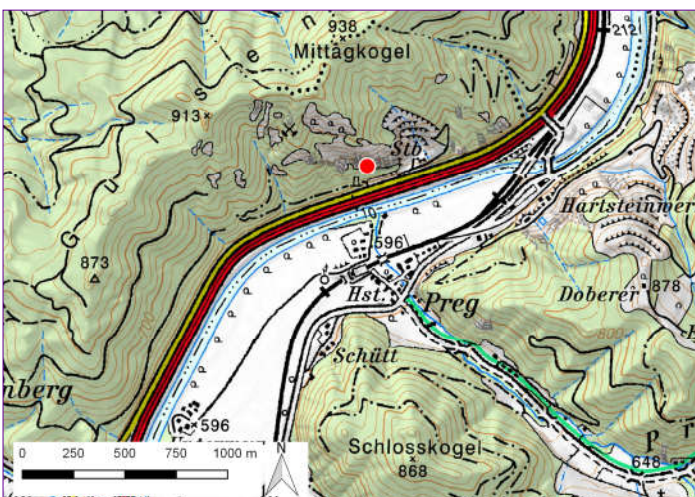
#### **terricolous species**

*Bilimbia lobulata* – u  
*Buellia elegans* – a  
*Buellia epigaea* – kx  
*Gyalolechia bracteata* ssp. *bracteata* – kx  
*Gyalolechia bracteata* ssp. *deformis* – a  
*Leprocaulon quisquiliare* – t  
*Phaeophyscia constipata* – a  
*Psora decipiens* – u  
*Psora globifera* – a  
*Romjularia lurida* – u  
*Toninia diffracta* – mx  
*Toninia opuntioides* – u  
*Toninia sedifolia* – u  
*Toninia tristis* – mx

#### **muscolous species**

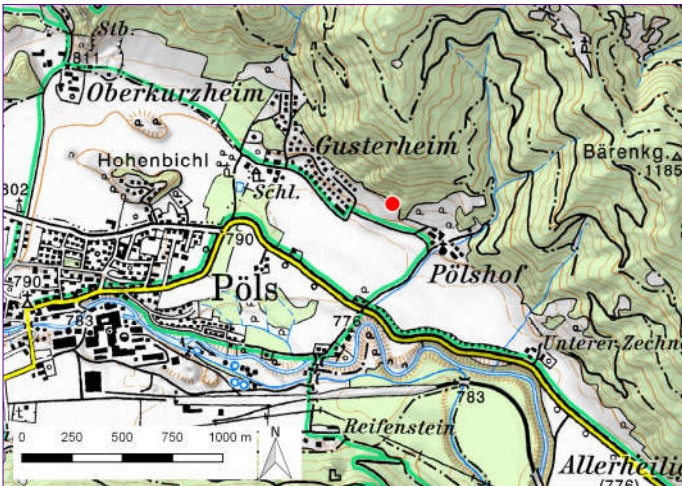
*Caloplaca stillicidiorum* – a  
*Phaeorrhiza nimbosea* var. *sareptana* – kx  
*Physconia muscigena* (also terricolous) – a  
**corticolous species** (rarely saxicolous or terricolous)  
*Flavoparmelia caperata* (saxicolous) – t  
*Flavopunctelia flaventior* – t  
*Melanelixia subargentifera* – t  
*Parmelia sulcata* – u  
*Parmelina tiliacea* (saxicolous) – t  
*Physcia adscendens* (saxicolous) – u

### **1 The Mur Valley**



**Fig. 3.** Location of dry grasslands at the Gulsen (@bergfex.at 2008, 2015).





**Fig. 4.** Location of *Stipa styriaca* population near Pöls (@bergfex.at 2008, 2015).

The Mur is the main river of the province Styria (see Fig. 1). Its source is in the “Hohe Tauern Mountains” and it flows into the Drava River in Croatia, in the borderland with Hungary. The middle section of the Mur Valley, up to the town of Leoben, was determined as the easternmost extension of the inneralpine dry valleys by Braun-Blanquet (1961). He pointed out that a higher fraction of the overall low precipitation than in other inneralpine dry valleys of the Eastern Alps is falling in summer (see Fig. 2), which might explain the rather humid nature of the landscape.

### 1.1 Gulsen near Kraubath (center: 14.9°E, 47.3°N, 660 m a.s.l.)

The Gulsen (Photos 1, 2; Fig. 3) hosts one of the most valuable habitats in Austria. It is part of the biggest connected serpentinite outcrop of Central Europe (Brooks 1987). From the biological point of view, the most important part, including the southern slopes, belongs to the Natura 2000 protected area AT2236000. Nevertheless, other parts are still endangered by the expansion of a quarry. The serpentinite bedrock, in combination with very steep (> 40°) southern slopes in a narrow valley, have attracted botanists since long ago (e.g. Preissmann 1885; Egger 1955, 1963) and Braun-Blanquet (1961) made relevés at this site. The high Mg/Ca proportion, along with a low soil content of N, P and K, are the most important abiotic factors influencing plant competition on serpentinite habitats in Central Europe (Kinzel & Weber 1982). These are the reasons for extrazonal occurrences of some plant species on serpentinites, e.g. *Notholaena marantae*. It seems that the Gulsen supports the only primary dry grasslands of Styria, although even here, in some places, the increasing cover of *Pinus sylvestris* during the last 50 years is evident (compare the photos in Egger 1955), obviously because of the abandonment of grazing by goats and sheep. The palaeoendemic species *Sempervivum pittonii*, with its closest relative occurring in Bulgaria (Lippert 1995), is a sign that some habitats have not changed very much since the Tertiary (Niklfeld 1973). This is at least possible, as this part of the Mur Valley was never glaciated (we will see the end moraine of the Würm glaciation ca. 20 km further up the



**Photo 3.** *Potentillo puberulae-Festucetum sulcatae* near Pölschhof with *Stipa styriaca* and outcrops of black mica schist. Photo: H. Köckinger.

valley, near the town of Judenburg). A typical steppe community of the association *Armerio-Potentilletum arenariae* (*Asplenio-Festucion pallentis*) has developed at the site, often occurring in mosaics with the association *Notholaeno-Sempervivetum hirti* (*Asplenion serpentini*) on rocks and in crevices.

### Some remarkable species:

*Alyssum montanum* var. *preissmannii*, *Armeria elongata*, *Asperula cynanchica*, *Asplenium cuneifolium*, *A. × adulterinum*, *Avenula adsurgens* s.str., *Carex humilis*, *Dianthus carthusianorum* subsp. *capillifrons*, *Dorycnium germanicum*, *Erica carnea*, *Erysimum sylvestre*, *Festuca eggeri*, *F. pallens*, *Jovibarba globifera* subsp. *hirta*, *Knautia xnorica*, *Koeleria macrantha*, *K. pyramidata* var. *pubiculmis*, *Myosotis stenophylla*, *Noccaea caerulescens*, *Notholaena marantae*, *Phleum phleoides*, *Poa stiriaca*, *Potentilla incana*, *Sempervivum pittonii* (palaeoendemic), *Seseli austriacum*, *Silene otites*, *Thymus praecox* s.str.; terricolous lichens (Suza 1931): *Cetraria islandica*, *Cladonia arbuscula* subsp. *squarrosa*, *C. cariosa*, *C. cenotea*, *C. chlorophaea*, *C. digitata*, *C. fimbriata*, *C. furcata*, *C. glauca*, *C. pyxidata*, *C. rangiferina*, *C. symphyocarpa*, *Enchylium tenax*, *Peltigera* spp., *Placidium rufescens*, *P. squamulosum*, *Psora decipiens*.

### 1.2 Habitat of *Stipa styriaca* near Pöls (center: 14.6°E, 47.2°N, 815 m)

Interestingly, the occurrence of this conspicuous, and in Styria very rare, genus in this secondary valley of the Mur Valley, near the town Judenburg (Fig. 4), was not reported before Melzer (1962). The plant was determined with some doubts as *Stipa joannis* but was later described as a new species *Stipa styriaca* (Martinovský 1970). The most important differences from *S. joannis* are longer leaves and the hairy leaf sheaths. There are some doubts on the taxonomical range of the population (Gonzalo et al. 2013), but in any case *Stipa styriaca* is one of the few Austrian species in the Annex II of the Flora and Fauna Habitat Directive and this population probably survived in this area since the last glaciation period. This is the last habitat of this species and fortunately the 7.8



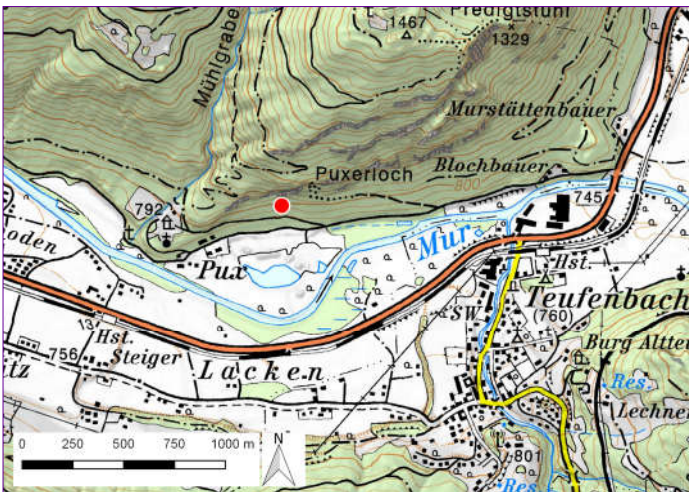


Fig. 5. Puxer Wand (@bergfex.at 2008, 2015).

hectares it occupies have been designated as a FFH protected area since 2005 (AT2223000, **Photo 3**). After abandonment of the regular husbandry in the 1960s, especially in the rocky areas, shrub encroachment became a serious problem and therefore a management program was established in recent years. The bedrock is black mica schist and these communities have been included in the association *Potentillo puberulae-Festucetum sulcatae* (*Festucion valesiacae*); in the rocky areas, *Seselietum austriaci* is probably also present (Mucina & Kolbek 1993a; Niklfeld 1979).

**Some remarkable species** (mosses last, species with a focus in the rocky areas underlined, H. Köckinger personal information)

*Ajuqa genevensis*, *Alyssum montanum*, *Artemisia campestris* subsp. *alpina*, *Asperula cynanchica*, *Astragalus cicer*, *Avenula adsurgens* s.str., *Carex humilis*, *Festuca pallens*, *Jovibarba globifera* subsp. *hirta*, *Knautia xnorica*, *Koeleria gracilis*, *K. pyramidata*, *Seseli libanotis*, *Phleum phleoides*, *Phyteuma persicifolium*, *Potentilla incana*, *P. heptaphylla*, *Primula veris*, *Pulsatilla pratensis* subsp. *nigricans*, *Seseli annuum*, *Stipa styriaca* var. *melzerii*, *S. styriaca* s.str.; mosses: *Coscinodon*

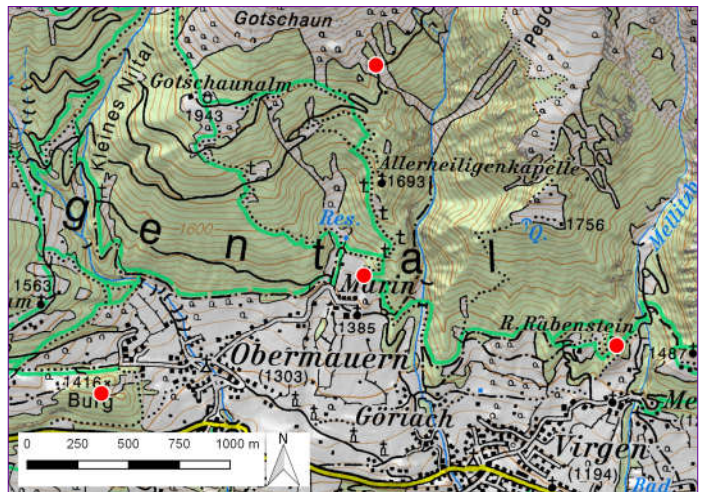


Fig. 6. Study areas in the Virgen Valley (East Tyrol), from west to east: Castle Hill in Obermauern, semi-dry hay meadow in Marin, alpine hay meadow, castle hill of Rabenstein (@bergfex.at 2008, 2015).

*cribrosus*, *Grimmia laevigata*, *G. pulvinata*, *Homalothecium sericeum*, *Hypnum vaucheri*, *Leucodon sciuroides*.

### 1.3 Puxer Wand, SW slopes of the Predigtstuhl (Gurktaler Alpen, center: 14.3°E, 47.1°N, 996 m a.s.l.)

The bedrock in the vicinity of two medieval castles, built within natural caves (**Photo 4**, **Fig. 5**), consists of palaeozoic limestone (GIS Steiermark 2017). Because of the occurrence of *Stipa eriocalis* subsp. *austriaca* and some other very rare plant species, the site was included in the FFH protected area AT2236000 (the same to which the Gulsen site belongs). Association: *Seselietum austriaci*.

**Some remarkable species** (mainly from Holzner et al. 1986, some additions from Kammerer 2006 and Zernig et al. 2015)

*Achnatherum calamagrostis*, *Asperula cynanchica*, *Aster amellus*, *Dianthus plumarius* subsp. *hoppei*, *Festuca pallens*, *Globularia cordifolia*, *Jovibarba globifera* subsp. *hirta*, *Junipe-*



Photo 4. Puxer Wand from the east. Photo: H. Köckinger.



Photo 5. Castle hill Rabenstein from southwest. Photo: M. Magnes.





**Photo 6.** Late July aspect of semi-dry hay meadow in Marin, Virgen. Photo: M. Magnes.

*rus communis*, *Nepeta cataria*, *Petrorhagia saxifraga*, *Seseli austriacum*, *Stipa eriocalis* subsp. *austriaca*.

## 2. East Tyrol, Virgental

Braun-Blanquet (1961) visited East Tyrol only briefly. He mentioned the floristic connection between the Italian part of the "Pustertal" (Rienz Valley) and the Austrian part (Drau Valley) because of the low pass between Toblach and Innichen. He also published a relevé of the castle hill of Rabenstein (Braun-Blanquet op. cit.: 240), but was a little disappointed about the weak arid character of the vegetation. Obviously even the transversal valleys in East Tyrol have some Mediterranean influence, as the Zillertaler Alps and the Großvenediger provide rain shadow from the west. Subsequently, Wagner (1979, 1985) pointed out the inneralpine dry character of the Virgen Valley and reported the annual precipitation of some villages in East Tyrol (Prägraten, 1340 m a.s.l.: 886 mm; Matrei 1050 m a.s.l.: 890 mm). Like Braun-Blanquet (1961), he emphasized the common occurrence of *Juniperus sabina* and *Hippophae rhamnoides* in grasslands of the south-facing slopes. Recently, Stöhr (2007, 2008) and Stöhr et al. (2015a, b) conducted an inventory of dry grassland species of East



**Photo 7.** *Onobrychis arenaria* subsp. *taurerica* in semi-dry hay meadow in Marin, Virgen. Photo: M. Magnes.

Tyrol and suggested some management practices for the castle hill of Rabenstein, a site which was already mentioned by Braun-Blanquet (1961).

The main bedrock of the south-facing slopes in this part of the Virgen Valley is limestone mica schist, as well as lateral moraine material in the lower parts (Geologische Karte der Republik Österreich 1:50.000, Blatt 152 Matrei in Osttirol, Mayer 2014). The annual precipitation of Virgen is 819 mm, and the mean annual temperature 6.4 °C (arithmetic mean 1993-2010, Stöhr et al 2015a).

### 2.1 Hill of the of castle ruin Rabenstein (top: 12.5°E, 47.0°N, 1408 m a.s.l.)

The castle, located North of the village Mellitz (Fig. 6, Photo 5), was first mentioned in the 12<sup>th</sup> century and the hill is the *locus classicus* of the association *Koelerio pyramidatae-Teucrietum montani*:

*Acinos alpinus* +, *Aster alpinus* +, *Astragalus leontinus* 1, *Brachypodium pinnatum* +, *Calamagrostis epigejos* 1, *Carex caryophyllea* 1, *Dianthus sylvestris* +, *Euphorbia cyparissias* +,

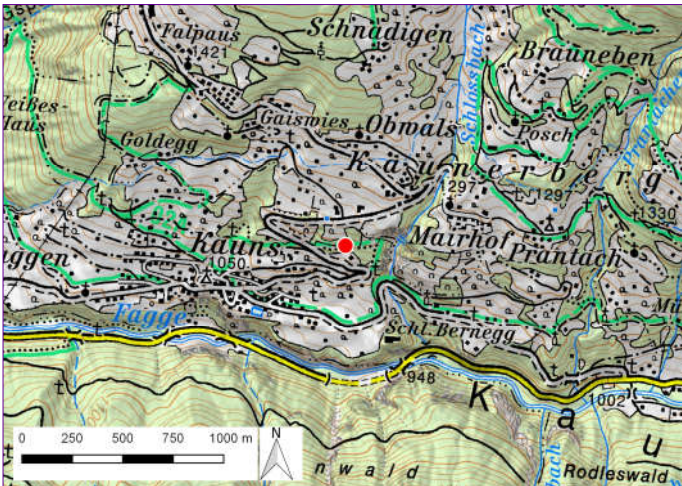


**Photo 8.** Subalpine hay meadow on the SW slope of the Zinizachspitze. Photo: M. Magnes.



**Photo 9.** *Astragalus penduliflorus* in a subalpine hay meadow. Photo: M. Magnes.





**Fig. 7.** Central part of the dry grassland near Kauns (@bergfex.at 2008, 2015).

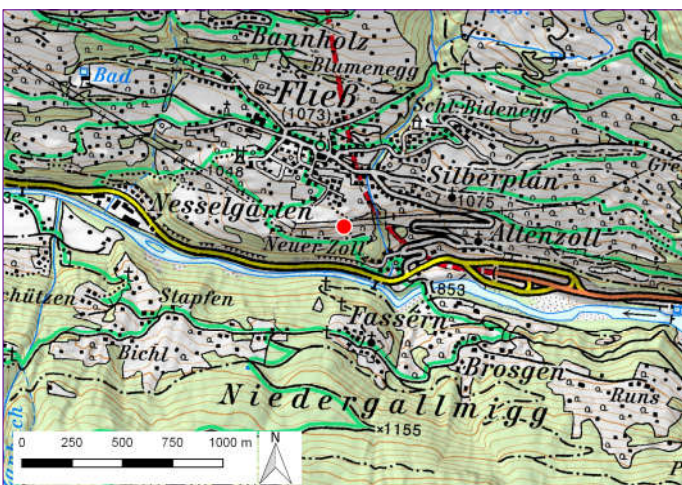
*Euphrasia stricta* +, *Festuca rupicola* +, *Galium* cf. *anisophyllum* +, *Globularia cordifolia* 1, *Gypsophila repens* 3, *Helianthemum nummularium* subsp. *grandiflorum* 1, *Koeleria pyramidata* 1, *Lotus corniculatus* +, *Onobrychis arenaria* +, *Orchis ustulata* +, *Orobanche teucrii* r, *Scabiosa triandra* +, *Teucrium montanum* 2, *Thymus x prohaskae* (Stöhr et al. 2015a think it was *T. carniolicus*) 1.

### 2.2 Semi-dry hay meadow in Marin (Virgen) (center: 12.5°E, 47.0°N, 1435 m a.s.l.)

This is one of the few remnants of unmanured hay meadows with a single cut in August (Fig. 6, Photos 6, 7). It is interesting to recognize how slowly grasses grow without manure. The slope of over 40° in this rather small patch is too steep for intensive utilization. The bedrock is limestone mica schist. Association: *Koelerio pyramidatae*-*Teucrietum montani*.

#### Some remarkable species:

*Antennaria dioica*, *Carex montana*, *C. sempervirens*, *Crepis* cf. *alpestris*, *Knautia maxima*, *Koeleria pyramidata*, *Laserpitium latifolium*, *Oxytropis campestris*, *Seseli annuum*.



**Fig. 8.** Center of the Fließer Sonnenhänge (@bergfex.at 2008, 2015).

### 2.3 Alpine hay meadow on the SW slope of the Zinizachspitze (Hohe Tauern) (center: 12.4°E, 47.0°N, 1862 m a.s.l.)

Hay meadows in the alpine and subalpine belt (in German "Bergmähder"), especially on calcareous bedrocks, are among the most species-rich man-made habitats in Europe (Mayer & Grabner 2004; Wieser 2002). This extremely labour-consuming land-use was common in the alpine valleys, where suitable places at lower elevations were rare or preferably utilized for arable cultivation. In some other places, water sources for livestock were insufficient. Unfortunately, this land-use has been recently abandoned, and our selected site is no longer managed either (Fig. 6, Photos 8, 9). According to Mayer & Grabner (2004), the grassland vegetation at such sites is difficult to classify, but probably it should be assigned to the class *Elyno-Seslerietea*. Most likely the association here at the south of the Großvenediger belongs to the *Campanulo scheuchzeri-Festucetum noricae*, which was reported from the nearby "Sajatmähder" (Isda 1986).

#### Some remarkable species:

*Arctostaphylos alpinus*, *Astragalus penduliflorus*, *Carex feruginea*, *Crepis aurea*, *Dianthus sylvestris*, *Doronicum glaciale*, *Gentiana verna*, *Globularia cordifolia*, *Gypsophila repens*, *Koeleria pyramidata*, *Molinia caerulea*, *Nigritella rhellicani*, *Oxytropis campestris*, *Pedicularis elongata*, *Phleum hirsutum*, *Phyteuma zahlbruckneri*, *Plantago atrata*, *Polygonum viviparum*, *Sempervivum arachnoideum*, *Sesleria caerulea*, *Trollius europaeus*.

### 2.4 Semi-dry pasture Obermauern (center: 12.4°E, 47.0°N, 1414 m a.s.l.)

This small hill is situated east of the Isel Gorge and 0.4 km west of the gothic church of Obermauern (Maria Schnee, 15<sup>th</sup> century, Fig. 6). The bedrock is limestone mica schist, and the grasslands belong to the association *Koelerio pyramidatae*-*Teucrietum montani*. Although the area is still grazed by cattle, shrub encroachment (*Juniperus sabina*, *J. communis*, *Berberis vulgaris*, etc.) is a serious problem, especially during the last 15 years (H. Mayrhofer, personal experience, Holzner et al. 1986: photo 41).

#### Some remarkable species (Holzner et al. 1986, Mayer 2014, Stöhr 2007, personal additions), mosses last

*Carex umbrosa*, *Dianthus sylvestris*, *Draba verna*, *Erysimum sylvestris*, *Galium lucidum*, *Juniperus communis*, *J. sabina*, *Koeleria pyramidata*, *Poa molinerii*, *Sempervivum arachnoideum*, *S. wulfenii*, *Seseli annuum*; mosses: *Abietinella abietina*, *Racomitrium canescens*.

## 3. Upper Inn Valley, Fließ and Kauns (Fig. 7, 8)

The Inn, the main river of Tyrol, rises in the Swiss Engadin near St. Moritz and runs into the Danube as a major tributary, at Passau (Lászlóffy 1965). Kielhauser (1953, 1954) studied the dry grassland vegetation of the Upper Inn Valley and reported an annual precipitation of only 646 mm at 1000 m a.s.l. (calculated for Kauns). The Lower Engadin and the Upper Inn Valley down to Landeck were treated by Braun-Blanquet (1961) together in one chapter, because of their similar summer-dry climate and vegetation of the association



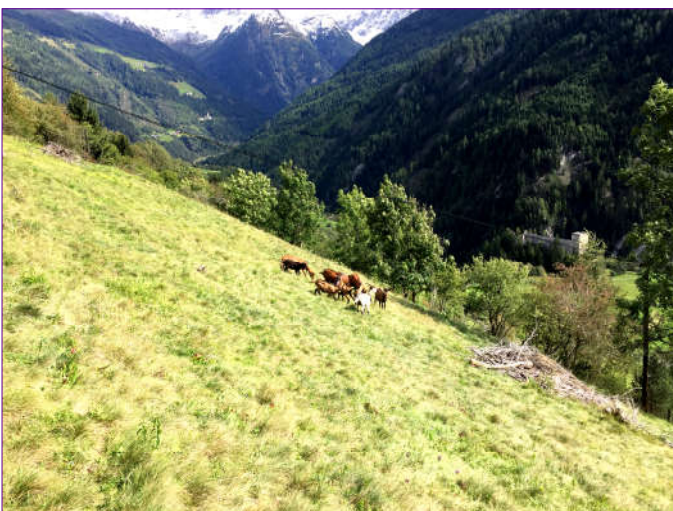


**Photo 10.** Tyrolean Grey Cattle grazing in a flat area of the Fließener Sonnenhänge. Photo: M. Magnes.



**Photo 11.** Central part of the Fließener Sonnenhänge, grazed by Tyrolean Grey Cattle. Photo: M. Magnes.

*Astragalo-Brometum*. Kielhauser (1954) pointed out that all local dry grasslands developed after clearcutting the former *Pinus sylvestris* forests and were exclusively used as pastures mostly with “Kleinvieh”, which means goats and sheep. There are also floristic and phytosociologic relationships to the neighbouring Vintschgau, obviously because of the low elevation of the Reschen mountain pass (1507 m a.s.l.). The areas south of the villages Fließ and Kauns are not only the largest but surely the most prominent inneralpine dry grasslands of Austria. Fortunately, both areas are protected parts of the “Naturpark Kaunergrat” and the Fließener Sonnenhänge (118.77 ha) belong also to the Natura 2000 network. The nature protected dry grassland areas around the villages Kauns and Faggen comprise 36.65 ha. The Naturpark is guiding the grassland management measures, some of which have been developed in a transboundary project (“Xeros”), together with scientists and area managers from the Vintschgau (Italy) and Engadin (Switzerland) (for further information see the homepage of the Nature Park Kaunergrat at: <http://www.kaunergrat.at/de/service/downloads/infomaterial/index.html>).



**Photo 12.** Goats grazing on dry grassland NE of Kauns. Photo: M. Magnes.

Braun-Blanquet (1961) expressed his excitement about the flower-rich *Berberido-Rosetum*, the optimum of which he designated in the Lower Engadin and the upper Vintschgau. At his time, this shrub association was widespread on field-stone heaps, as boundaries to arable fields or between properties, or even simply for ornamental purposes. It was an important fodder for goats but also for cattle. At the Fließener Sonnenhänge, there are still some remnants visible, especially on borders of pastures grazed by Tyrolean Grey Cattle (**Photos 10, 11**).

From the cultural point of view, the old “Mariä Himmelfahrt church”, from the early 14<sup>th</sup> century, is very interesting: the foundations are from a Christian church of the 6<sup>th</sup> century.

### 3.1 Kauner dry grasslands (center: 10.7°E, 47.1° N, 1222 m a.s.l.)

Main bedrock is platy limestone (Bündnerschiefer), often covered by calcareous moraine material (Geologische Bundesanstalt 1918, Kielhauser 1954).

Associations: *Astragalo-Brometum* and *Achnathero-Stipetum capillatae*; *Agropyro dumetori-Artemisietum absinthii* on heavily grazed and nutrient rich sites (**Photo 12**).

**Some remarkable species** (Pagitz et al. 2005), mosses, lichens last

*Allium carinatum* s.str., *Anthemis tinctoria*, *Anthericum liliago*, *Arabis nova*, *Artemisia absinthium*, *A. campestris* s.str., *Asperula cynanchica* s.str., *Astragalus onobrychis*, *Avenula praeusta*, *A. pratensis*, *Bothriochloa ischaemum*, *Botrychium lunaria*, *Brachypodium rupestre*, *Bromus erectus* s.str., *Carex humilis*, *Crepis taraxacifolia*, *Cynoglossum officinale*, *Festuca guestfalica*, *F. supina*, *F. valesiaca*, *Herniaria glabra*, *Hippophae rhamnoides*, *Juniperus communis* s.str., *J. sabina*, *Knautia maxima*, *Koeleria macrantha*, *K. pyramidata* s.str., *Melica ciliata* s.str., *M. nutans* s.str., *M. transsilvanica*, *Onobrychis viciifolia*, *Ononis spinosa*, *Onopordum acanthium*, *Orchis ustulata*, *Petrorhagia saxifraga*, *Phleum phleoides*, *Picris hieracioides*, *Pinus cembra*, *Plantago strictissima*, *Potentilla alpicola*, *Pseudolysimachion spicatum*, *Scabiosa triandra*,





Fig. 9. Castle hill of Griffen (©bergfex.at 2008, 2015).

*Scleranthus annuus*, *Sisymbrium strictissimum*, *Stipa capillata*, *Thesium linophyllum*, *T. pyrenaicum*; mosses (Buzas & Dixon in Pagitz et al. 2005): *Abietinella abietina*, *Didymodon fallax*, *Syntrichia calicolens*.

### 3.2 Fließer Sonnenhänge (Schwienbacher & Kiebacher 2008, center: 10.6°E, 47.1°N, 1031 m a.s.l.) (see Fig. 8)

The main bedrock is phyllite gneiss or quartz phyllite, often covered by calcareous moraine material (Geologische Bundesanstalt 1918; Schwienbacher & Kiebacher 2008).

Associations: *Astragalo-Brometum*; *Achnathero-Stipetum capillatae* on calcareous bedrock.

On rock outcrops and extremely shallow soils: *Sclerantho-Sempervivetum arachnoidei* (*Sedo-Sclerenthetalia*).

**Some remarkable species** (Schwienbacher & Kiebacher 2008, mosses last)

*Amelanchier ovalis*, *Artemisia absinthium*, *A. campestris*, *Asperula cynanchica*, *Aster amellus*, *Astragalus onobrychis*, *Bothriochloa ischaemum*, *Carex humilis*, *C. montana*, *Dianthus sylvestris*, *Festuca valesiaca*, *Hippophae rhamnoides*, *Koeleria macrantha*, *K. pyramidata*, *Lappula squarrosa*, *Myosotis ramosissima*, *Ononis spinosa*, *Orchis ustulata*, *Oxytropis pilosa*, *Petrorhagia saxifraga*, *Phleum phleoides*, *Rhamnus saxatilis*, *Scabiosa lucida*, *Sempervivum arachnoideum*, *S. tectorum*, *Stipa capillata*; mosses: *Abietinella abietina*, *Funaria hygrometrica*

### 4. Carinthia: castel hill of Griffen (center: 14.7°E, 46.7°N, 613 m a.s.l.)

The rocky steppes on the south and southwest-facing Triassic-limestone slopes of the castle hill of Griffen will be the last scientific destination of the 11<sup>th</sup> EDGG field workshop (Fig. 9). The castle was first mentioned in 1146 but is probably older. In the flowstone cave at the foot of the castle hill, there is evidence of human settlement from the Palaeolithic. Braun-Blanquet (1961) studied these impressive rocky steppes, even though he did not plot them in his map of inneralpine dry

valleys. The dry habitats are less climate conditioned (the next station Völkermarkt shows 949 mm annual precipitation, with a median annual temperature of 7.8 °C) but rather influenced by the extreme steepness of the south-facing limestone slopes.

Association: *Seselietum austriaci*.

### Some remarkable species (Wieser et al. 2004)

*Aethusa cynapium*, *Alyssum repens*, *Arabidopsis arenosa*, *Asperula cynanchica*, *Aster amellus*, *Astragalus cicer*, *Aurinia saxatilis*, *Bothriochloa ischaemum*, *Brachypodium rupestre*, *Campanula thyrsoides* subsp. *carniolica*, *Carex montana*, *C. umbrosa*, *Centaurea stoebe*, *Dianthus plumarius* subsp. *hoppei*, *Festuca pallens*, *Fraxinus ornus*, *Iris variegata*, *Jovibarba globifera* subsp. *arenaria*, *Juniperus communis*, *Koeleria macrantha*, *K. pyramidata*, *Nepeta cataria*, *Onobrychis vicifolia*, *Ononis spinosa*, *Phleum phleoides*, *Scabiosa columbaria*, *S. triandra*, *Seseli annuum*, *S. austriacum*, *Silene hayekiana*, *S. rupestris*, *S. saxifraga*, *Sisymbrium officinale*, *Veronica teucrium*.

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# Biodiversity patterns of dry grasslands in the Central Apennines (Italy) along a precipitation gradient: experiences from the 10<sup>th</sup> EDGG Field Workshop

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**Abstract:** The 10<sup>th</sup> EDGG Field Workshop took place in a sector of the Central Apennine Mountains, Italy, in June 2017. Altogether, 22 researchers from nine European and Asian countries attended this Field Workshop. We sampled plant and insect biodiversity in submontane and lower-montane grasslands along a precipitation gradient, from the L'Aquila valley and the Fucino basin to the "Abruzzo, Lazio & Molise" National Park. The standardized EDGG sampling protocol, involving nested-plot series and additional 10-m<sup>2</sup> relevés, was used. In the course of seven days of intensive fieldwork, we sampled 20 biodiversity plots along with 57 additional normal plots (yielding a total dataset of 97 10-m<sup>2</sup> plots). Methodological additions tested in this workshop included the assessment of observer-related error (around 12% of the 10-m<sup>2</sup> plots was resurveyed by a different team). In all plots, vascular plants, bryophytes and lichens were sampled. At each nested-plot series, also insects (*Auchenorrhyncha*) were sampled by local specialists, who developed an ad-hoc sampling procedure.

**Keywords:** Apennines; *Auchenorrhyncha*; biodiversity; bryophyte; dry grassland; dry valleys; EDGG; Italy; lichen; nested plots; precipitation gradient; vascular plant.

## Introduction

Since 2009, the EDGG has carried out research expeditions dedicated to the collection of high-quality data on biodiversity and compositional patterns of grasslands in understudied regions of the Palaearctic. The first event, attended by a small group of six scientists, took place in the Transylvanian Lowland (Romania; Dengler et al. 2009) and was followed by eight more: Central Podolia in Ukraine (Dengler et al. 2010), NW Bulgaria (Apostolova et al. 2011), Sicily (Guarino et al. 2012), NW Greece (Dengler & Demina 2012), Khakassia in Russia (Janišová et al. 2013), Navarre in Spain (Biurrun et al. 2014), Southern Poland (Kački et al. 2014) and Serbia (Ačić et al. 2017). As a scientific group, EDGG warmly supports the exchange of knowledge among participants and, at the same time, is strongly focused on the analysis of collected data, which are used for joint publications in international peer-reviewed journals (see Dengler et al. 2012a; Pedashenko et al. 2013; Turtureanu et al. 2014; Kuzemko et al. 2014, 2016; Polyakova et al. 2016; and others currently in preparation).

Here we present our report of the 10<sup>th</sup> Field Workshop, which took place in Italy from 3<sup>rd</sup> to 11<sup>th</sup> June, 2017. It was organized by Goffredo Filibeck, Laura Cancellieri (both from University of Tuscia, Viterbo, Italy) and Marta Gaia Sperandii (University of Roma Tre, Rome). Leonardo Rosati (University of Basilicata, Potenza, Italy) generously helped with both organization and fieldwork as an expert of Apennine vegetation. Samuele Maestri (M.Sc. student at University of Tuscia) helped as an assistant to the organizers. During fieldwork in L'Aquila basin, the workshop was joined also by Anna Rita Frattaroli (University of L'Aquila) and Fabio Conti (University of Camerino) who, during the planning phase, had provided useful advice concerning some specific locations, as local experts of floristics and vegetation.

Participants in the workshop were, as usual for these EDGG events, a mixture of experienced scientists and young post-docs or Ph.D. students. Altogether 22 researchers from nine European and Asian countries attended this Field Workshop.

To complement the botanical sampling with insect biodiversity data, Adalgisa Guglielmino (University of Tuscia) and Christoph Bückle (Tübingen, Germany) joined the research expedition in order to sample *Auchenorrhyncha* (a suborder of Hemiptera, including, inter alia, leafhoppers and planthoppers).

## Aims and study area

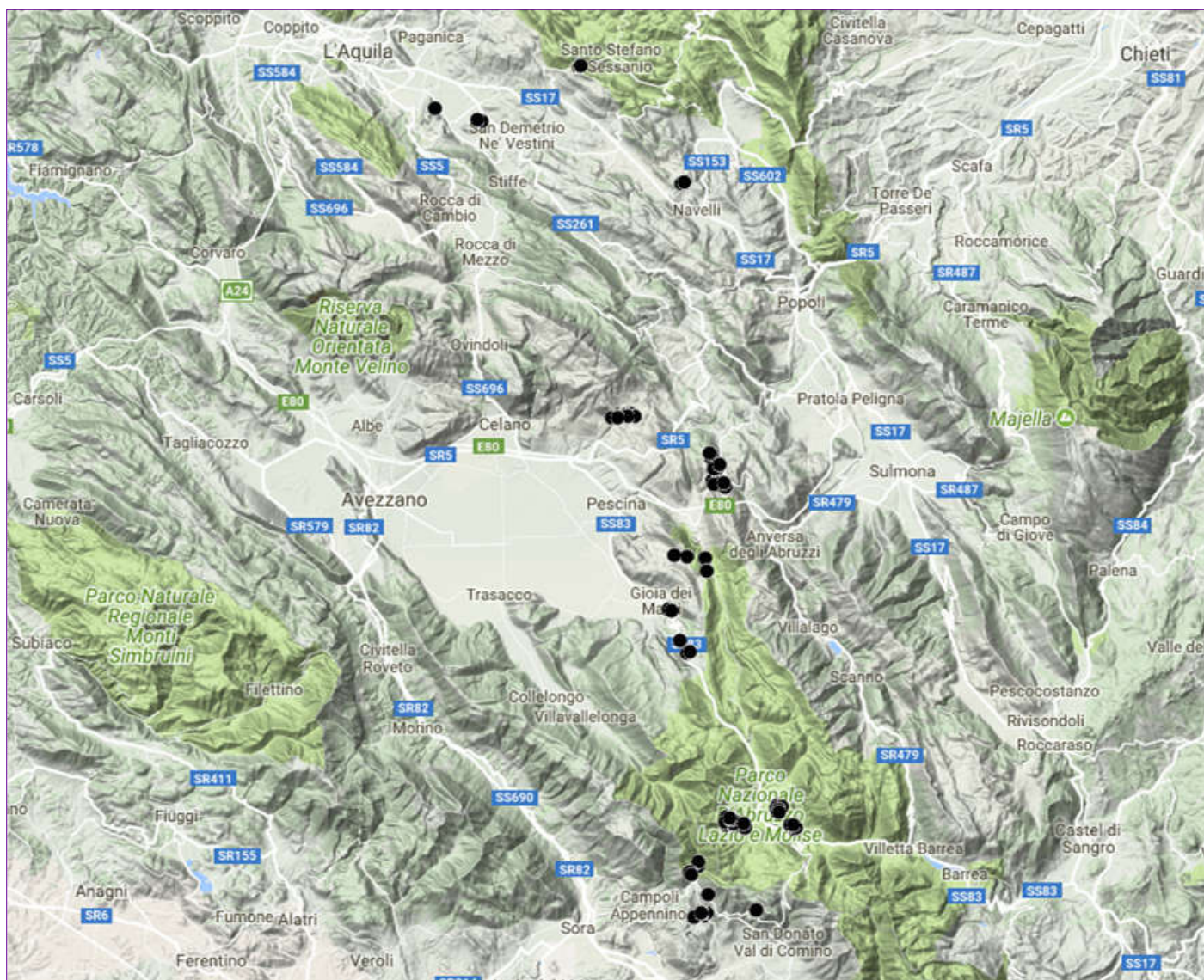
The main topic of the 10<sup>th</sup> Field Workshop was sampling plant richness and composition patterns across a precipitation gradient in the Central Apennine Mountains (Abruzzo and Lazio regions, Italy). Because of the rain-shadow effect, some inner valleys in this area (Fucino basin, Capestrano valley, L'Aquila valley) feature low annual precipitation values (less than 600 mm). In these Apennine "continental valleys", there is a number of taxa featuring a disjunction with E-European steppes: e.g. *Alyssum desertorum*, *Androsace maxima*, *Astragalus exscapus*, *Crocus variegatus*, *Goniolimon italicum*, *Salvia aethiops*, *Sideritis italica*, *Stipa capillata* (Conti & Bartolucci 2015; Morretti et al. 2015; Cancellieri et al. 2017a). The flora of

these basins is thus somewhat similar to that of the well-known Alpine "dry valleys" (Schwabe & Kratochwil 2004; Wiesner et al. 2015). However, while in the Alps the precipitation regime features a summer maximum, in the Apennines there is a sub-Mediterranean climate with a summer drought or at least with a summer rainfall minimum (Gerdol et al. 2008; Blasi et al. 2014; Filibeck et al. 2015), leading to an interesting mixture of steppic and Mediterranean elements in the grassland flora. Just a few kilometers away from such dry inner valleys, the W-facing outer slopes of the Apennines feature a "sub-Mediterranean oceanic" climate, characterized by very high annual precipitation, up to 1500 mm. The whole gradient is often compressed into a transect of less than c. 15 km. The expedition was organized in order to sample plant and insect diversity in grasslands within a pre-defined elevational belt (Apennine sub-montane and lower-montane bioclimatic belts, i.e. between 700 and 1300 m a.s.l.: Gerdol et al. 2008) and bedrock (limestones and calcareous conglomerates), but moving along the precipitation gradient, relying on high-resolution interpolated climatic data provided by M. Brunetti (Institute of Atmospheric Sciences and Climate, Bologna, Italy).

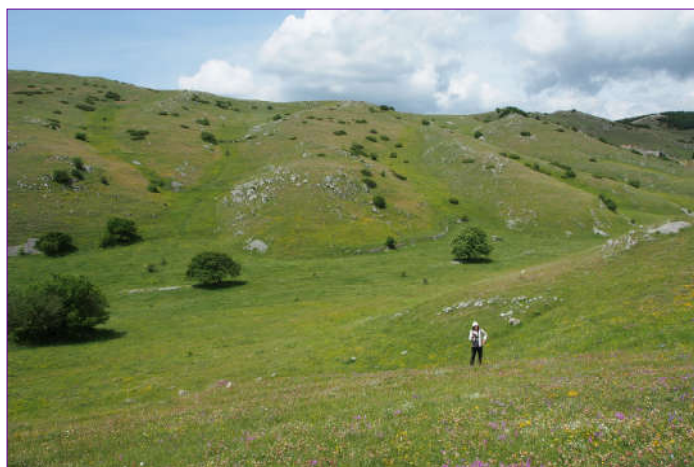
Much of our vegetation sampling was performed within the "Abruzzo, Lazio & Molise" National Park and within its buffer area, except for a couple of days spent in other districts, such as the foothills of the Monte Velino massif and L'Aquila basin (Fig. 1). The National Park was established in 1923, originally with the aim of protecting areas of relatively intact forests and two endemic taxa of large mammals, the Marsican brown bear (*Ursus arctos marsicanus*) and the Apennine chamois (*Rupicapra pyrenaica ornata*). The area also hosts a large population of wolf (*Canis lupus*), and red deer (*Cervus elaphus*) was reintroduced in the 1970s. However, the park nowadays aims at protecting the full diversity of habitats and the traditional agro-pastoral activities that maintain them (Primi et al. 2016). The park and its immediate surroundings encompass a rich flora featuring 2114 vascular plant species and subspecies, including 137 taxa endemic to Italy (Conti & Bartolucci 2015).

The prevailing geological substrata in the study area are Mesozoic limestones and dolomites; conglomerate, calcareous arenite, clay and marl substrata also occur. The geomorphology is characterized by widespread karstic landforms (Fig. 2). At low elevations (500-800 m a.s.l.), the climate is sub-Mediterranean, with one or two dry months in the summer, annual precipitation between 700-1200 mm, mean annual temperature >10°C and only minimal occurrence of frost. The landscape within this belt is dominated by *Quercus pubescens* and *Q. cerris* woods, along with large extensions of secondary grasslands. Across the submontane (800-1200 m a.s.l.) and montane belts (1200-1800 m a.s.l.), summer drought stress decreases with altitude (although the precipitation regime still features a distinct minimum in summer and maximum in autumn), and the incidence of winter/spring frost is greater: annual precipitation is between 1100-1600 mm, and mean annual temperature is between 6 and 9 °C (Filibeck et al. 2015). Most of the landscape within the montane belt is dominated by *Fagus sylvatica* forests and by sec-





**Fig. 1.** Map of the study area indicating the position of the sampled plots (black dots).



**Fig. 2.** Typical geomorphological features of the study area, with dry karstic valleys devoid of water courses. Olmo di Bobbi pass, near Cocullo (buffer area of “Abruzzo, Lazio & Molise” National Park). Photo: M. Janišová.



**Fig. 3.** Landscape mosaic (1300 m a.s.l., montane belt) composed of beech forests, abandoned forested pastures (“difese”) and secondary dry grasslands. Pesco di Lordo valley, near Pescasseroli (“Abruzzo, Lazio & Molise” National Park). Photo: M. Janišová.



ondary grasslands (Fig. 3). Finally, the subalpine belt (>1800 m a.s.l.; not included in our sampling) is characterized by prolonged snow cover and late-spring frost. This belt is covered mainly with primary grasslands, prostrate shrub vegetation, rocks and screes (Bruno & Bazzichelli 1966).

In the Central Apennines, transhumance shepherding emerged during the 6th century BC or earlier (Brown et al. 2013) and was widely practiced until the 1950s. Nowadays, most of the husbandry is sedentary, and sheep stocking rates are drastically lower than those of the early twentieth century. The most common stocking system now involves grazing from mid-June to mid-October in public pasturelands, leased by each municipality to individual farmers. In the study area, the decrease of sheep husbandry has resulted in a steep increase in bovine and equine grazing. Most of the cattle and horses nowadays belong to “part-time farmers” (i.e., people who derive their main income from other activities). The animals are thus left free-ranging night and day in the wild, sometimes without being checked for many months (Primi et al. 2016). This is probably leading to major changes in both floristic composition and landscape patterns.

Mowing has never been a large-scale management system in the study area, because of the sub-Mediterranean summer drought (coupled with the limestone bedrock and karst hydrology), which yields only one harvest per year (Manzi 1990). Moreover, hay was not a crucial commodity as sheep flocks were moved to the mild-climate coastal lowlands in winter, so mowing was necessary only for the winter needs of the small population of cattle, which was not involved in transhumance. Although hay-making was connected to a complex and interesting system of co-ordinated management between private and public land (including the possibility for

shepherds to hire the right of grazing their flocks in private lots after the mowing season: Fig. 4) (Manzi 1990), it was, and still is, restricted to the more productive and mesic habitats (such as clayey slopes, deep-soil bottoms of karst depressions, seasonally flooded plains, etc.), that are not included in the sampling scheme of this Workshop.

In spite of a few phytosociological studies on the Central Apennine dry basins (Avena & Blasi 1979; Tammaro 1984, 1995; Frattaroli 1989; Pirone & Tammaro 1997; Pirone et al. 2001; Theurillat et al. 2007), knowledge on grassland biodiversity and composition patterns, and on their relationships with environmental variables, is still very limited. The grasslands of the submontane and montane belts of the Abruzzo National Park itself are not very well known, although some phytosociological data were presented by Bruno & Bazzichelli (1966), Biondi et al. (1992), Pedrotti et al. (1992), Lucchese et al. (1995), Di Pietro et al. (2005) and Primi et al. (2016). A paper on biodiversity patterns of the karstic basins in the upper-montane belt of the Park’s core area, based on randomized nested plots (restricted to the 0.01, 0.1 and 1 m<sup>2</sup> spatial scales) is currently under preparation by G. Filibeck et al. (see also Cancellieri et al. 2017b).

### Sampling methodology

The sampling design basically followed the standard EDGG methodology, with a few additions tested during the 2017 Field Workshop. The implementation of the standard EDGG protocol throughout all the Research Expeditions/Field Workshops allows large-scale comparisons and synthesis of phyto-diversity data (Dengler et al. 2016a). Originally developed by Dengler (2009), subsequently revised and improved, and recently described (Dengler et al. 2016b), this protocol consists of an intensive nested plot sampling, covering plot sizes of 0.0001, 0.001, 0.01, 0.1, 1, 10 and 100 m<sup>2</sup> (altogether forming a so-called “biodiversity plot”) (Fig. 5) and complemented by additional 10-m<sup>2</sup> “normal” plots (Fig. 6). Plots were arranged in the landscape in order to cover a variety of physical habitats (as for land-form types, slope aspect and inclination, etc.) and vegetation types; each plot was placed in a visually homogeneous stand. For each plot and subplot, all terricolous vascular plants, bryophytes and lichens were identified and recorded whereas, for 10 m<sup>2</sup> subplots and “normal” plots, percentage cover values for the species were visually estimated and a set of environmental parameters (including GPS coordinates, elevation, slope, aspect, microrelief, soil depth, cover of rocks and stones, land form, land use), together with detailed structural data of the vegetation (e.g. mean vegetation height), were measured. A mixed soil sample was taken for laboratory analysis.

One of the main methodological novelties introduced in the 10<sup>th</sup> Field Workshop was the estimation of observer-related error. Most studies on this topic have found mean values of pseudo-turnover (i.e. of the difference in species composition between teams of observers, surveying the same plot) ranging from 10% to 30% (Morrison 2016). These figures are large enough to blur and potentially bias the relationships between environmental variables and vegetation patterns, but this issue is still surprisingly disregarded in the vast majority of



**Fig. 4.** Complex pattern of land-use types in the landscape of Colli Bassi near Pescasseroli (“Abruzzo, Lazio & Molise” National Park): the conglomerate hillocks are public land and are covered with dry grassland used for grazing, while the small doline depressions (appearing to be greener in this picture) are private properties and are used for wheat crops (as in this picture) or for hay-making. Shepherds hire the right of grazing the hillock grasslands from the municipality, and the right of grazing the doline bottoms (in order to exploit the re-growth after the crop or hay has been harvested) from a consortium of landowners. Photo: M. Janišová.





**Fig. 5.** Starting a biodiversity plot on a conglomerate hillock. Colli Bassi, near Pescasseroli (“Abruzzo, Lazio & Molise” National Park). Photo: M. Janišová.

papers. In order to estimate measures of inter-observer pseudo-turnover, around 12% of the 10-m<sup>2</sup> plots were resurveyed by a different team. Additionally, we made sure that each 10-m<sup>2</sup> plot was surveyed by at least three people, and we also recorded the starting and finishing time.

Grazing plays a significant role in our study area, with complex spatial patterns of both grazing intensity (number of animals per unit area) and type (different species of domestic animals occur in different areas: sheep, goats, cattle, horses), so another major addition to the protocol was a detailed grazing load assessment. This was achieved through a survey based on faecal pellet transects, performed a few days after the expedition at each sampling location by a dedicated team (composed of graduate students of wildlife management from the University of Tuscia, supervised by A. Amici and R. Primi).

Minor innovations introduced this year included: burying a magnet in every 10-m<sup>2</sup> subplot or normal plot, in order to potentially enable re-visitation studies in the future with precise re-localisation of the plots; sampling soil depth at five pre



**Fig. 6.** Performing a 10-m<sup>2</sup> “normal” plot on a species-rich calcareous hump. Olmo di Bobbi pass, near Cocullo. Photo: G. Filibeck.

-defined points (in order to prevent any unwitting bias when sampling very stony or rocky sites, for instance), instead of choosing the points haphazardly; using a predefined legend (tailored on the specific landscape of the study area) for noting down land-use and land-forms. Contrary to practice on the 2016 Field Workshop, we did not sample standing biomass, because of the huge variability in grazing intensity among the study sites.

Following previous experiences of invertebrate-sampling in EDGG expeditions (e.g. in the 2014 Field Workshop a specialized taxonomist sampled spiders in the biodiversity plots), this year we invited two entomologists to join the expedition in order to test cross-taxon patterns between plants and *Auchenorrhyncha*. An *ad-hoc* procedure was developed during the planning phase and refined in the field in order to avoid effects on the entomological sampling arising due to the activities of botanists in the plot (or vice versa, such as effects on the vegetation due to trampling of the vegetation by entomologists). Insects were sampled along a 5-m wide strip, surrounding each biodiversity plot on three sides, in order to leave one side available to the botanists for accessing the plot. A 1-m wide buffer was also left between the biodiversity plot edges and the entomological “sampling strip”. Insect samples were collected using a vacuum aspirator (100 soil contacts on each of the three sides) and, in addition, with a sweep net (100 sweeps on each of the three sides) (Fig. 7).

### Workshop presentations

At the beginning of the Field Workshop, G. Filibeck gave two keynote talks, one introducing the study area and another on the methodological additions.

In the subsequent days, participants who had received a travel grant gave oral presentations, namely:

J. Dengler: *Phytodiversity of Palaearctic grasslands: background of EDGG Field Workshops and the GrassPlot database*;

I. Demicz: *Drivers of plant species richness patterns at different spatial scales and taxonomic levels – a case study from two Bulgarian mountains*;

D. Vynokurov: *Coenotic differentiation of the steppe and desert vegetation of the Republic of Kalmykia*.

### Data analysis

Vascular plant specimens were taken to the University of Tuscia, where L. Cancellieri is coordinating a small team working on their identification during the winter. The Floristics Research Centre in Barisciano (Gran Sasso National Park), coordinated by F. Conti, will help with the identification of critical taxa. Bryophytes and lichens were sent to M. Aleffi (University of Camerino) and G. Potenza (University of Basilicata), respectively, who are currently working on their determination. Soil samples were transported to A. Vacca (University of Cagliari) for analysis.

### Preliminary results

During the course of seven days of intensive fieldwork, we sampled 20 biodiversity plots, along with 57 additional normal plots (yielding a total dataset of 97 10-m<sup>2</sup> plots). Further-



**Fig. 7. Entomologists at work adjacent to a biodiversity plot.**  
Photo: L. Rosati.

more, 12 10-m<sup>2</sup> plots within the biodiversity plots were resurveyed, so that pseudo-turnover assessment could be performed on ca. 12 % of the plots.

The vascular plant species with highest average cover included (in alphabetical order, as cover values have not been fully analysed yet): *Bromopsis erecta* (= *Bromus erectus*), *Carex caryophyllea*, *Festuca circummediterranea*, *Helictochloa praetutiana* (= *Avenula praetutiana*), *Koeleria splendens* and *Phleum hirsutum* subsp. *ambiguum* among graminoids; *Anthyllis vulneraria*, *Hippocrepis comosa* and *Medicago lupulina* for legumes; *Globularia meridionalis*, *Helianthemum* spp., *Helichrysum italicum* and *Satureja montana* as for chamaephytes.

While we are still busy with plant determination, a preliminary overview of vascular plant species richness (cryptogam species richness data are not reliable at this stage), based on the unrevised field notes, shows relatively high values (Table 1) when compared to other regions of the Palaeartic (Dengler et al. 2016a), almost approaching the richness values found during the 2014 expedition in Navarre, Spain (Biurrun et al. 2014).

**Table 1.** Preliminary vascular plant species richness data for the dry grasslands in the study region.

Plot size (m <sup>2</sup> )	n	Mean	Min	Max
0.0001	40	2.7	0	6
0.001	40	4.6	0	10
0.01	40	8.9	1	18
0.1	40	18.6	9	30
1	40	31.6	19	46
10	97	49.5	25	79

## Conclusions and outlook

Once the plant identification is completed, the data from the 10<sup>th</sup> EDGG Field Workshop will be used to produce at least two papers: one describing plant diversity patterns across the precipitation gradient and other environmental gradients of

the study area, and another one on the relationship between species composition and environmental variables. Moreover, at least two additional research topics will be analyzed, such as the relationship between plant and insect patterns along the study gradient and the analysis of pseudo-turnover.

The data from this Workshop will be included in GrassPlot, the Database of Scale-Dependent Phytodiversity Patterns in Palaeartic Grasslands (Janišová et al. 2017) (formerly: *Database Species-Area Relationships in Palaeartic Grasslands*; GIVD ID EU-00-003; Dengler et al. 2012b). The inclusion of data in international databases will also allow future large-scale comparative studies and promote scientific networking between researchers.

The EDGG is continuing the expedition program and the next 11<sup>th</sup> Field Workshop will be held in Austria (6<sup>th</sup> – 13<sup>th</sup> July 2018), organized by M. Magnes (see a detailed call in this issue on pp. 12-25).

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## Author contribution

The paper was written by GF and MGS, with substantial contributions by JD and IB. All authors contributed to the text editing. The appendix text was written by EB, NS and NT; they also selected the pictures for the photo diary, that were provided by the authors listed at the end of the appendix.

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**Group photo of the 10th EDGG Field Workshop. Photo: M. Janišová.**



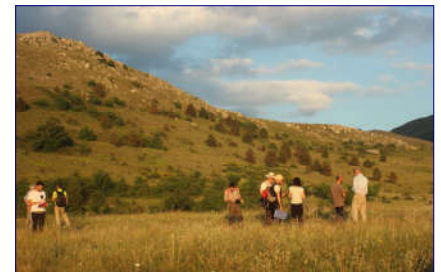
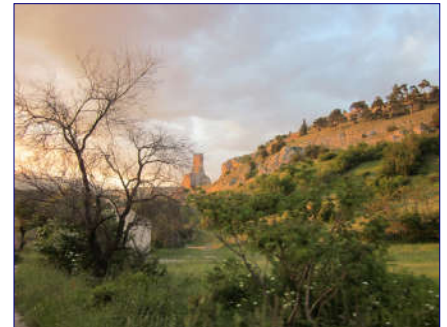
## Appendix: a photo diary of the Field Workshop

*Edited by Elena Belonovskaya, Nikolay Sobolev and Nadezda Tsarevskaya*

Photos for the diary were provided by: E. Belonovskaya, A. Berastegi, I. Dembicz, J. Dengler, D. Frank, I. García-Mijangos, M. Janišová, M. Magnes, N. Sobolev, M.G. Sperandii, N. Tsarevskaya, D. Vynokurov.

### Day 1 (June 3, 2017)

We met in Fiumicino Airport (Rome) and travelled eastward by bus along a very beautiful road, to the small town of Pescina (where our first hotel was) on the edge of the Fucino basin – a former lake drained in the 19th century. The afternoon began with methodological instructions in the hotel's meeting room. Then we drove to the plateau overlooking Pescina, where we had an introduction to the identification of the most common plant species. Abandoned arable lands and pastures surprised us with their rich diversity of plant species. As a bonus, we enjoyed a nice sunset.



*Phlomis fruticosa*



*Orobanche sp.*



*Ophrys bertolonii*



*Brachypodium distachyon*



*Anacamptis coriophora*





**Day 2 (June 4, 2017)**

Early in the morning we drove to Collarmeale at the foothills of the Sirente-Velino massif, where vast expanses of secondary grasslands exist (formerly grazed by large flocks of sheep, nowadays by a mixture of sheep and cattle). The climate here is rather continental (by Italian standards), with annual precipitation <600 mm. There began our field work. Jürgen gave us a "master class" in the field about sampling biodiversity plot. The first plot of the expedition was performed by all participants together. At the end, we felt that we needed lunch. After having restored our strength, we divided into small groups and started sampling "steppic" secondary grasslands. As for our impression, road margins and arable lands have surprised us by a lot of beautiful flowers and rare plant species. The landscape became especially attractive due to the windmills on the top of the surrounding ridges. Some of us could understand Don Quixote's feelings.





**Day 3 (June 5, 2017)**

In the morning we drove northward, up to L'Aquila basin, for sampling the grasslands near Navelli. This place is supposed to be the driest end of our precipitation transect. On the south-facing slopes we met fragments of very dry grasslands with *Juniperus oxycedrus* and *Quercus pubescens*. The latter were growing mostly in a shrubby form and showed traces of fire or were completely burnt.

We then visited the Floristics Research Centre of Gran Sasso National Park in Barisciano, at the foothills of Gran Sasso massif. The Centre is hosted in a former medieval abbey and impressed us for the very well-organized Herbarium with glass cupboards in rooms with constant temperature, as well as for its study rooms, library and garden. We were very grateful to Dr. Fabio Conti, coordinator of the Centre, and Dr. Anna Rita Frattaroli from L'Aquila University for their help and hospitality. We had an Italian-style picnic (with a little rain) in the courtyard of the Centre.

In the afternoon we were expected to divide into smaller groups in order to sample some more "continental" grasslands within the L'Aquila basin, namely near Barisciano, Sant'Eusanio and Fossa Raganessa (locus classicus of the only West-European *Goniolimon* species). However, a heavy thunderstorm allowed performing only one plot (near Barisciano). We had to rush to the vehicles down slippery trails under heavy hail!



*Matthiola fruticulosa*

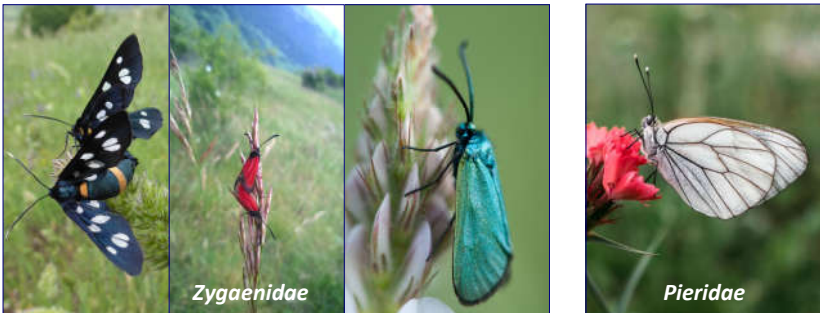




**Day 4 (June 6, 2017)**

Morning was overcast and rather chilly. We drove to the Olmo di Bobbi pass in the buffer area of Abruzzo National Park. We sampled plots in vast grasslands with nice views towards the Majella massif. An off-road vehicle driven by the national park rangers helped the various teams to spread in order to sample different habitats. The rugged landscape was covered with beautiful-looking grasslands as most species were in full flower. Busy insects seemed to enjoy them as much as we did...

We had a picnic lunch in Ortona dei Marsi village, enjoying a scenic view on the Giovenco river valley. In the afternoon we drove to the remote village of Aschi, in the Abruzzo National Park, to sample *Stipa*-rich grasslands. A team went to also sample the grassland where the recently discovered population of *Astragalus exscapus* grows - the only known locality in the Apennines. The area was very rich in Orchids (mostly from genera *Ophrys*, *Orchis* and *Himantoglossum*). In the evening we "packed" our laboratory for the next day's transfer to another hotel.



Zygaenidae

Pieridae



*Polygala major* and *Hippocrepis comosa*



*Orchis anthropophora*



*Rhinanthus minor*



*Ophrys apifera*



*Platanthera chlorantha*



*Polygala major*



**Day 5 (June 7, 2017)**

After the hotel check-out we said good-bye to Pescina and drove southward to Gioia Vecchio pass for sampling small grassland clearings with intermediate precipitation level. These grasslands too were colorful with great numbers of orchids and other interesting species.

Our picnic lunch was at Gioia Vecchio lookout, near a church and an interesting patio with wall frescoes. Then we drove to Opi in the heart of Abruzzo National Park (with a coffee at Pescasseroli en route), where we climbed a very steep slope (Colle dei Carpini) and sampled grasslands in the wettest part of our precipitation gradient. This sampling site offered us a beautiful view of the Sangro valley and of the typical hilltop village of Opi. In the evening we reached our second hotel, in the valley bottom near Opi.



*Zygaenidae*



*Campanula glomerata*



*Iphiclides podalirius* on *Pinus nigra*



**Day 6 (June 8, 2017)**

The morning was bright and sunny. We sampled grasslands near Pescasseroli in a beautiful landscape of karst morphology on conglomerate bedrock, with traditional cereal fields in doline depressions and dry pastures on the hillocks. We sampled several biodiversity and normal plots. After our successful fieldwork, in the late afternoon we visited the headquarters of Abruzzo National Park in Pescasseroli. We had a discussion on the Park's strategies and challenges with the Chairman of the Park Agency, Mr. Antonio Carrara. Dr. Cinzia Sulli, head of the scientific department at the Park Agency, gave us a tour of the Wildlife Centre.

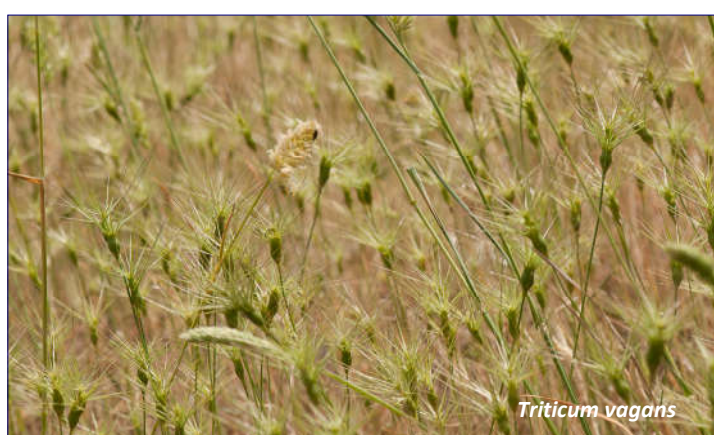
In the evening some young colleagues gave their talks. Iwona reported on Bulgarian mountain grasslands. Denys presented results from a study trip to Kalmykia. The talks were followed by interesting debate.

*Neotinea tridentata**Larva of Lepidoptera*



**Day 7 (June 9, 2017).**

On the 7<sup>th</sup> day we drove from Opi across the main watershed of the Apennine mountain range (Forca d'Acero Pass), down to the SW-facing slopes, where annual precipitation is high but seasonal distribution of precipitation is more markedly Mediterranean (i.e. with a more pronounced summer drought). We sampled grasslands surrounded by woods of *Ostrya carpinifolia* near San Donato, Campoli Apennino and Alvito, in a beautiful rural landscape with huge karstic valleys.

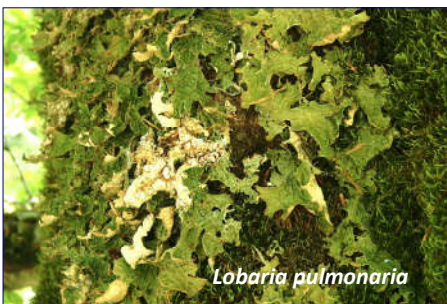




**Day 8 (June 10, 2017)**

The last day we drove to La Difesa near Pescasseroli, where we sampled small grassland clearings among the beautiful pasture-forest with huge beech trees, which were pollarded for leaf-fodder in the old days. We saw on these trees the large thalli of a "charismatic" lichen, *Lobaria pulmonaria*.

In the afternoon, back to Pescasseroli for sight-seeing in the old town and for visiting the "pecorino" (=sheep cheese) shop - a product from dry grasslands! Then back to the hotel for dismantling our "laboratory" and packing the huge number of samples of soils, cryptogams, and vascular plants.

*Lobaria pulmonaria**Geranium austropenninum**Iris cf. marsica**Lycaenidae**Fagus sylvatica*



## Participants of the 10th EDGG Field Workshop



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Leonardo Rosati & Edy Fantinato



Dieter Frank



Nikolay Sobolev



Christoph Bückle



Itziar Garcia & Martin Magnes



Samuele Maestri



Laura Cancellieri



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Idoia Biurrun



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Edy Fantinato & Rongxiao Che



Denis Vynokurov



Monika Janišová



# Going backwards to look to the future: Traditional hay meadow management modernization for cost effectiveness and nature conservation

## Project Interreg SUDOE SOS Praderas tries new approaches towards hay meadow conservation

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### Introduction

During the last 10 years, we have witnessed in Picos de Europa (Cantabrian Mountain Range, Northwest Spain) the disappearance of the last generation of people mowing manually with a scythe. They were usually aged people, maintaining their meadows in the same way it had been done for centuries. We were very concerned about losing this last generation (Fig. 1). We can still find people and meadows managed in a traditional way but they are very scarce. Having this impression of something very valuable being lost before our eyes, we decided to move on and look for new insights into the conservation of this agroecosystem. We created a consortium with Portuguese and French partners, sharing the same challenges and succeeded in obtaining financial support from the Interreg Programme, which addresses sustainable development and seeks to reinforce cooperation within natural protected areas (Fig. 2).

### The challenge

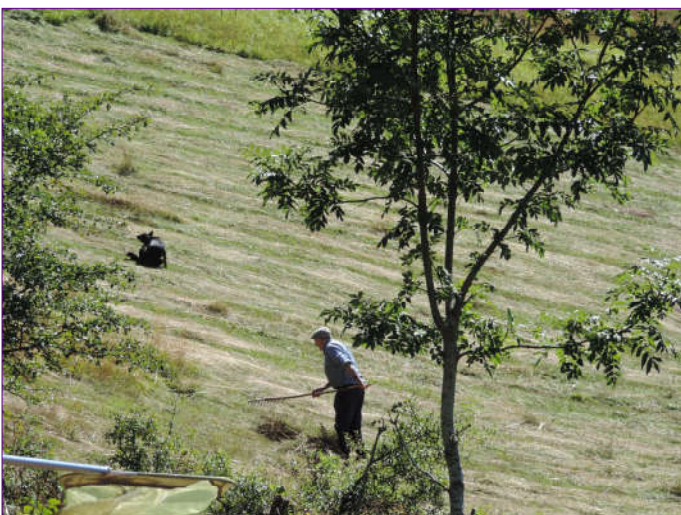
Rural abandonment, together with global climate change, are the two principal conservation problems at Picos de Europa National Park (Northern Spain), affecting all the ecosystems and species. These are very rapid changes that are reshaping a system that had been stable for centuries.

Throughout the whole of Europe, the abandonment of traditional land-uses, such as low intensity land cultivation and livestock husbandry, is leading to a loss of habitats dominated by sparse vegetation, thereby giving rise to a succession towards forest habitats (Poschold et al. 2005).

Sustainably managed semi-natural grassland harbour a high biodiversity, especially of plants, butterflies and many other insect groups (Collins & Beaufoy 2012). Grasslands are the main habitat for many European butterflies, whose abundances have declined by 30% since 1990. Although the precise causes for the decline are different for each species and country, the two main drivers are agricultural intensification and abandonment of grasslands (Van Swaay et al. 2015). Picos de Europa is a hotspot of butterfly diversity in the Iberian and moreover in the European context (van Swaay & Warren 2006; Romo et al. 2007), and its hay meadows contribute to a great proportion of this richness (Fig. 3).

Unpublished data have shown a loss of 30% of hay meadows in Picos de Europa National Park between 2000 and 2010. This process, linked with rural abandonment, is probably having a major influence on the population dynamics of many species, and potentially resulting in the disappearance of whole populations of plants, butterflies and surely many other insect groups, unless active conservation management practices are implemented.

Along with this, a very serious economic crisis is affecting Spain, particularly in rural areas (national unemployment rate of 16.7% in 2017, rising to 38.2% for people under 25 years old). In Picos de Europa, animal husbandry is being aban-



**Fig. 1.** Santiago González, 80 years old, mowing in Güembres hay meadows (Sajambre, León, Picos de Europa National Park), August 2016. Photo: A. Mora.





**Interreg Sudoe SOS PRADERAS**  
European Regional Development Fund



**Title** Going backwards to look to the future: Traditional hay meadows management modernization towards cost effectiveness and nature conservation

**Reference** SOE1/PS/E0376

**Leader partner** Oviedo University (UNIOVI)

**Partners** Picos de Europa National Park (PNPE)  
Semillas Silvestres, S.L. (SESIL)  
Gobierno de Aragón (ARAGOB)  
Bragança Polytechnic Institute (IPB)  
National Institute for Agrarian and Veterinary Research (INIAV)  
Pyrénées and Midi-Pyrénées National Botanic Conservatory (CBNMPM)

**Total budget** 1.244.000 €

**EU contribution** 933.000 € (75%)

**Time frame** 36 months (1/07/2016–30/06/2019)

www.sospraderas.eu  
info@sospraderas.eu

Fig. 2. SOS Praderas factsheet.

done because of its scarce rentability and its toughness in this marginal mountain area. Young people are not continuing their parents' familiar occupations but are changing to the services and tourism sector or emigrating. Communal natural resources are therefore being abandoned with a triple negative consequence: loss of jobs, loss of biodiversity and loss of cultural heritage. We are urged to seek new ways of cost effective and sustainable exploitation of these resources.

### SOS Praderas main objective

Our focus is on trying to make hay meadow exploitation cost effective through: (1) Valuing them as places of natural and cultural heritage, (2) Getting CAP grants for traditional management practices and, (3) Developing a new market product: hay meadow autochthonous seed mixtures. We are conscious that in mosaic mountainous landscapes, such as those we are trying to conserve, the economic solution must also comprise a mosaic of different and complementary measures.

How are we going to achieve our goal? SOS Praderas is going backwards to reach into the future. We must resurrect the traditional knowledge about hay meadow management, which has conserved them throughout the centuries, and adapt it to new machinery, new working schemes, new agrarian policies and new markets, so as to attain cost effectiveness and also being able to conserve nature.

### Actions

SOS Praderas is structured in several task groups, according to five main objectives: getting a picture of the conservation status of hay meadows in southwestern Europe (GT1); creating cooperation network among Natura 2000 area managers to enhance hay meadow conservation (GT3); stimulating CAP grants to maintain hay meadows (GT4); conserving hay meadow seeds in germoplasm banks besides characterising seeds and fruits (GT2 and GT5); and hay meadow seed pro-

duction, harvesting, processing, stocking, certification and marketing (GT6 and GT7). We briefly describe each task group.

### GT1. Hay meadows conservation status diagnosis in the SUDOE territory (southern France, Spain and Portugal)

- Floristic and soil characterization of mesophile hay meadows at the Natura 2000 study sites.

- Historical evolution analysis of hay meadows at the Natura 2000 study sites.

We have already obtained some worrying results in Picos de Europa National Park. We have analysed the evolution of 20% of the area covered by hay meadows in the Park from 1956 until the present. There has been a loss of 68.50% of hay meadow surface area in this 61 year period. The rate of loss has doubled during the last 10 years. The process is now peaking. Urgent action needs to be taken.

### GT3. Cooperation among natural protected area managers.

- Creation of an e-mail list of natural area managers in the SUDOE territory to open up the project to as many protected areas as possible.

- Three Field workshops in different Natura 2000 study sites. Already done in Portugal (Montesinho and Alvao Natural Parks) and in Spain (Picos de Europa National Park) (Fig. 4). Third visit to France (Pyrénées National Park). The aim of these visits is to enhance exchange between managers and to see the reality of hay meadows and their management in all these places.

- Direct actions on hay meadows. Conservation measures, such as mowing, boundaries pruning, manuring or any other management action to conserve them. Picos de Europa National Park, linked to its butterfly conservation programme,

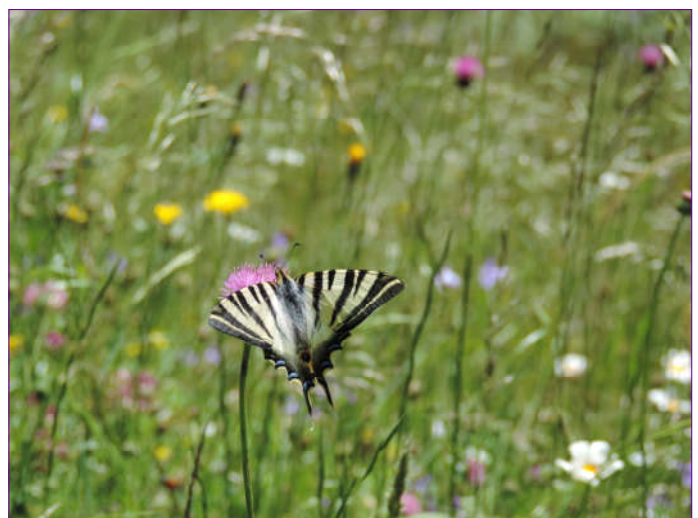


Fig. 3. Scarce swallowtail, *Iphiclides podalirius*, in Güembres hay meadows (Sajambre, León, Picos de Europa National Park), June 2016. Photo: A. Mora.

has taken this kind of action since 2015 in abandoned hay meadows.

- A report on future collaboration options between natural protected areas. This report is aimed at gathering together all fields of collaboration which have emerged from the process of exchange between different protected areas during the project. Its objective is to establish a base for future collaboration projects.

**GT4. The new Communitarian Agrarian Policy (CAP) and Rural Development Plans: their actual and potential capacity to preserve hay meadows.**

- Assess grant opportunities in new CAP policy and new Rural Development Plans (2014-2020) to subsidize hay meadow conservation and native seed production.
- Analyze existing measures in all EU territories to maintain hay meadows and study the feasibility of their regional application to the SUDOE area.
- Design and disseminate regional management proposals to grant hay meadow maintenance within the current CAP-RDP 2014-2020.

**GT2. Native seeds ex-situ conservation in Germoplasm Banks**

- Creation of a list of representative hay meadow species.
- Harvesting of these species' seeds.
- Seed conservation in Germoplasm Banks.
- Protocols of seed germination (under ENSCONET standard)
- Germination capacity length analysis.
- Checking of hay meadows species representation in Germoplasm banks.

**GT5. Fruit collection. Most representative species fruit and seed characterisation.**

- Morphometric characterisation of fruits and seeds (image analysis with statistics about variability range)
- Seed Identification keys → Tool for certifying the quality and composition of commercial seed mixtures.

**GT6. Hay meadow seed production and harvesting**

- Harvesting assays with different methodologies (mowing, sweeping or combine harvester) to identify the best method to obtain an adequate seed mixture.
  1. Selection of hay meadows for assays (good plant diversity, good access for machinery, owners agreement).
  2. Biomass transport to SESIL or CNBPMP project partner-facilities, to extract the seeds and analyse its quantitative and qualitative content, to assess the effectiveness of each method.
  3. Phenology assays in two sites to test the influence of date of harvesting on the composition of seed mixtures.
- Best method for each site: cheaper cost/kg of seeds; easier on fieldwork; product quality → more similar seed composition to the original meadow.
- Culture protocols for species chosen to reproduce in mono-specific fields (the most difficult to harvest directly).

**GT7. Seed processing, stocking, certification and management**

- Seed cleaning and drying protocol development.
- Pre-germination treatment protocols and packing.
- Seed mixture marketing analysis. Potential clients.
- Conservation mixtures under Directive 2010/60/UE, legal base for packs design, commercial brands and logos.

We are open to collaboration with other institutions in future projects about hay meadow conservation; agroecosystems and nature conservation; and sustainable development within natural protected areas.

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**Fig. 4. SOS Praderas team visiting Picos de Europa National Park, northern Spain, July 2017. Photo: A. Mora.**



**Short contribution****Invitation to apply for an interesting PhD study**

A PhD research position will be available at Comenius University in Bratislava and Institute of Botany, Slovak Academy of Sciences in Banská Bystrica, Slovakia, with the topic

**"Diversity and conservation management of Carpathian grasslands".**

The position is for four years, starting in September 2018 and is suitable for a student who would like to focus on European montane grasslands. The Carpathian grasslands have a unique position among the world's grassland ecosystems - they are extraordinarily species rich and many of them are still maintained by traditional rural communities, which is not the case in other regions of Europe.

The field research in all Carpathian countries (with a special focus on Romania, Slovakia and Ukraine) will include detailed biodiversity sampling together with ethnobotanical investigations on traditional ecological knowledge in selected regions. The following questions are to be answered: How do historical and actual conditions interact in shaping the grassland diversity patterns we find today? What is the contribution of abiotic environmental conditions and that of agricultural practices? Given the fact that high nature value grasslands are among the most threatened habitats of the

continent, what types of agricultural management are capable of conserving and maintaining grassland biodiversity? Which approaches, based on traditional ecological knowledge, can be implemented in state nature conservation of the included countries? And finally, what are the ways to stimulate people to perceive the beauty of traditional landscapes and to appreciate the value of diverse grassland habitats, as well as the high quality of rural agricultural products?

Students with a completed degree in biology, environmental or agricultural sciences, are invited to apply (the registration will soon be available at the Comenius University webpage) and to contact the supervisor: Monika Janišová, Institute of Botany SAS in Banská Bystrica, e-mail: [monika.janisova@gmail.com](mailto:monika.janisova@gmail.com).

Good language skills in English are necessary. Native speakers of at least one language used in the study area and students experienced in field botany or ethnobotany, and those with a good knowledge of applied ecology or sustainable agriculture, will be favoured.

**Monika Janišová, Banská Bystrica, Slovakia**  
[monika.janisova@gmail.com](mailto:monika.janisova@gmail.com)



*Species-rich meadows in the Ukrainian Carpathians. Sarata, July 2016.*  
Photo: M. Janišová

## 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 [anymeadow.ak@gmail.com](mailto:anymeadow.ak@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.

### Biodiversity of grasslands

Bátori, Z., Erdős, L., Kelemen, A., Deák, B., Valkó, O., Gallé, R., Bragina, T. M., Kiss, P.J., Kröel-Dulay, G. & Tölgyesi, C. 2018. Diversity patterns in sandy forest-steppes – a comparative study from the western and central Palaeartic. *Biodiversity and Conservation* 27: 1011–1030.

Palpurina, S., Wagner, V., von Wehrden, H., Hájek, M., Horskák, M., Brinkert, A., Hölzel, N., Wesche, K., Kamp, J., (...) & Chytrý, M. 2017. The relationship between plant species richness and soil pH vanishes with increasing aridity across Eurasian dry grasslands. *Global Ecology Biogeography* 26: 425–434.

### Ecology of grasslands

Wagner, V., Chytrý, M., Zelený, D., von Wehrden, H., Brinkert, A., Danihelka, J., Hölzel, N., Jansen, F., Kamp, J. (...) & Wesche, K. 2017. Regional differences in soil pH niche among dry grassland plants in Eurasia. *Oikos* 126: 660–670.

Labadessa, R., Alignier, A., Cassano, S., Forte, L. & Mairota, P. 2017. Quantifying edge influence on plant community structure and composition in semi-natural dry grasslands. *Applied Vegetation Science* 20: 572–581.

### Flora of grasslands

Fekete, R., Mesterházy, A., Valkó, O. & Molnár V., A. 2018. A hitchhiker from the beach – The spread of a maritime, halophyte species (*Cochlearia danica* L.) along salted continental roads. *Preslia* 90: 23–37.

### Conservation and restoration of grasslands

Valkó, O., Tóth, K., Kelemen, A., Migléc, T., Radócz, S., Sonkoly, J., Tóthmérész, B., Török, P. & Deák, B. 2018. Cultural heritage and biodiversity conservation – Plant introduction and practical restoration on ancient burial mounds. *Nature Conservation* 24: 65–80. URL: <https://natureconservation.pensoft.net/articles.php?id=20019>.

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*Syntrichia ruralis* var. *ruraliformis* in the nature reserve "Mainzer Sand", Germany. Photo: J. Dengler



## Forthcoming events

### Macroecology 2018

#### **Macroecology in the age of big data**

10–13 April 2018 in Birmensdorf, Switzerland

Website: <https://www.wsl.ch/lud/macro2018/>

Deadline: 28 February 2018

### 3<sup>rd</sup> International Conference

#### **Classification of vegetation and habitats of Ukraine**

19–21 April 2018 in Kyiv, Ukraine

Contact: [vegetation.conf@ukr.net](mailto:vegetation.conf@ukr.net)

Deadline: 1 March 2018

### 11<sup>th</sup> Seminar of Ecology

#### **2018 with international participation**

26–27 April 2018 in Sofia, Bulgaria

Website: <http://www.iber.bas.bg/?q=en>

Deadline: 26 March 2018

### 27<sup>th</sup> Congress of the European Vegetation Survey

23–26 May 2018 in Wrocław, Poland

Website: <http://evs2018wroclaw.uni.wroc.pl/>

Deadline: 16 March 2018

### 15<sup>th</sup> Eurasian Grassland Conference (EGC)

#### **Cooperating for grassland conservation**

4–8 June 2018 in Sulmona, Italy

Website: <http://edgg.org/egc2018>

Deadline: 30 April 2018

Details: see page 4–11 of this issue

### 5<sup>th</sup> International Conference

#### **Plant World in the Red Data Book of Ukraine: Implementation of the Global Strategy of Plant Conservation**

25–28 June 2018 in Kherson, Ukraine

Contact: [redbookconference@gmail.com](mailto:redbookconference@gmail.com)

Deadline: 30 March 2018

### Jahrestagung 2018 der Floristisch-soziologischen Arbeitsgemeinschaft (FlorSoz)

29 June –2 July 2018 in Graz, Austria

Website: <https://floristisch-soziologisch.uni-graz.at/>

Deadline: open until filled...

### 11<sup>th</sup> European Congress of Entomology

2–6 July 2018 in Naples, Italy

Website: <http://www.ece2018.com/>

Deadline: 28 February 2018

### 11<sup>th</sup> EDGG Field Workshop

#### **Grasslands of inneralpine dry valleys, part 1: Eastern Alps**

6–13 July 2018 in Austria (starting in Graz)

Deadline: 31 March 2018

Details: see page 12–24 of this issue

### 61<sup>th</sup> Symposium of the International Association for Vegetation Science (IAVS)

#### **Natural Ecosystems as Benchmarks for Vegetation Science**

22–27 July 2018 in Bozeman, Montana, USA

Pre-symposium excursions: 17–21 July; post-symposium excursion: 28 July – 1 August

Website: <http://iavs.org/2018-Annual-Symposium/Home.aspx>

Deadline: 5 March 2018

### 48<sup>th</sup> Annual Meeting of the Ecological Society of Germany, Austria and Switzerland

#### **Ecology – meeting the scientific challenges of a complex world**

10–14 September 2018 in Vienna, Austria

Website: <https://www.gfoe-conference.de/>

Call for contributions not yet open

### 7<sup>th</sup> Balkan Botanical Congress

10–14 September 2018 in Novi Sad, Serbia

Website: <http://www.7bbc2018.com>

Deadline: 1 June 2018

### 16<sup>th</sup> Eurasian Grassland Conference (EGC)

Summer 2019 in Graz, Austria



*Crocus biflorus*, Alta Murgia, Italy. Photo: Rocco Labadessa

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**Important dates:** The deadline for Bulletin 37 is 10 March 2018

Bulletin 37 to appear: Spring 2018

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**Subalpine grasslands in the Swiss pre-Alps near Einsiedeln. Photo: J. Dengler**