

12th European Dry Grassland Meeting

From Population Biology to Community Ecology

22-27 May 2015, Mainz, Germany

Book of Abstracts

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Pulsatilla vulgaris at the Martinsberg site in Rhine Hesse. Photo: Th. Becker

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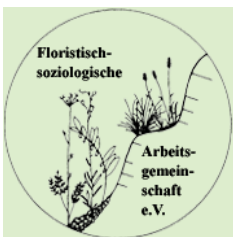
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Conference venue

Green School in the Botanic Garden and adjacent lecture hall „Muschel“, Anselm-Franz-von-Bentzelweg 9b, D-55099 Mainz, GERMANY

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Oliver Kienberg, University of Trier, GERMANY

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Persons involved in the **excursions** see under “Excursion guide”

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Program

Friday, 22.05.2015 – Green School and Botanic Garden

- 16:00-18:00 **Registration (Green School)**
18:00-20:00 **Informal meet-up with *Weck, Worscht and Woi* (Green School and Botanic Garden)**

Saturday, 23.05.2015, morning – Lecture hall "Muschel"

- 09:00-09:25 **Welcome address**
09:25-10:10 Invited talk **Joachim W. Kadereit**
Biogeography of Rhine Gorge Orophytes
10:10-10:30 Regular talk **Anna Kuzemko**, Dmytro Dubyna, Tatiana Dziuba, Ivan Moysiyenko, Yulia Vasheniak, Maryna Zakharova
Syntaxonomy of the sandy and rocky grasslands of Ukraine: preliminary results of large-scale analysis
10:30-11:00 **Coffee break**
11:00-11:20 Regular talk **Olga Demina**, Pavel Dmitriev
Classification of the psammophytic vegetation of the Don River Basin
11:20-11:40 Regular talk **Oleksii Kovalenko**
Dry grasslands of the National nature park "Pyryatynsky" (Ukraine): syntaxonomy, florotypology and rare plant species
11:40-12:00 Regular talk **Eleonora Giarrizzo**, Sabina Burrascano, Laura Facioni, Laura Zavattoni, Carlo Blasi
Causes and outcomes of change in species composition of the Apennine semi-natural grasslands in the last fifty years
12:00-12:20 Regular talk **Emanuela Carli**, Piera Di Marzio, Carmen Giancola, Attilio Di Giustino, Bruno Paura, Giovanni Salerno, Agnese Tilia, Carlo Blasi
Good practices of management of 6210(*) dry grasslands in Molise (Central Italy)
12:20-12:40 Regular talk **Jürgen Dengler**, Iva Apostolova, Thomas Becker, Idoia Biurrun, Steffen Boch, Iwona Dembicz, Christian Dolnik, Nikolai Ermakov, Monika Janišová, Itziar García-Mijangos, Riccardo Guarino, Anna Kuzemko, Swantje Löbel, Hristo Pedashenko, Mariya Polyakova, Eszter Ruprecht & the participants of the EDGG Research Expeditions
Diversity patterns in Palaeartic dry grassland vegetation – commonalities and differences across large biogeographic gradients derived from the data of the EDGG Research Expeditions
12:40-14:00 **Lunch break Mensa**

Saturday, 23.05.2015, afternoon – Lecture hall "Muschel"

- 14:00-14:20 Regular talk **Balázs Deák**, Béla Tóthmérész, Orsolya Valkó, Barbara Sudnik-Wójcikowska, Tatyana M. Bragina, Ivan Moysiyenko, Iva Apostolova, Nikolay Bykov, Iwona Dembicz, Péter Török
Cultural monuments and nature conservation: The role of kurgans in maintaining steppe vegetation
- 14:20-14:40 Regular talk **Saifi Merdas**, Mohamed Tahar Hanafi, Bachir Sakaa, Toufik Mostefaoui, Yacine Kouba, Salemkour Nora, Ahmed Menad
The impact of livestock grazing on plant species composition and diversity in arid steppe of Algeria
- 14:40-15:00 Regular talk **Mohammad Jankju**, Zakieh Ghasemi Mayvan, Mansoor Mesdaghi
Effect of summertime burning and livestock grazing on plant species composition and diversity, in a dry grassland in Quchan, Iran
- 15:00-15:20 Regular talk **Mélanie Harzé**, Arnaud Monty, Grégory Mahy
Do large scale restoration projects reduce within-species trait variability? A calcareous grasslands case study
- 15:20-16:00 **Coffee break**
- 16:00-16:20 Regular talk **Pamela Hafner**, Holger Rößling
EU-LIFE project "Sandy Grasslands"
- 16:20-16:40 Regular talk **Orsolya Valkó**, Balázs Deák, Béla Tóthmérész, Péter Török, Sándor Konyhás, Zsolt Végvári
Wildfires as drivers of lekking distribution of Great Bustard (*Otis tarda*) – Implications for nature conservation
- 16:40-18:30 **Poster session 1**

Sunday, 24.05.2015 – Lecture hall "Muschel"

- 09:30-10:15 Invited talk **Martin Diekmann**
Long-term changes in the vegetation of dry calcareous grasslands – evidence from community and population ecology
- 10:15-10:35 Regular talk **Monika Janišová**
Linking biosystematic, ecological and population-biological approaches in a study of *Tephroseris longifolia* agg.
- 10:35-11:00 **Coffee break**
- 11:00-11:20 Regular talk Catherine Anne Linn, **Eva Maria Griebeler**
Habitat preference of German *Mantis religiosa* populations (Mantodea) and potential conservation measures
- 11:20-11:40 Regular talk **Marina B. Fardeeva**, Tatiana Rogova
Effect of grazing on the population structure of *Adonis vernalis* L. in the basin of the Middle Volga
- 11:40-12:00 Regular talk **Nina Šajna**, Jelka Šuštar-Vozlič, Mitja Kaligarič
Population biology of an in situ Pleistocene survivor
- 12:00-12:20 Regular talk **Jaime Kigel**
Summer Dormancy in Mediterranean perennial grasses
- 12:20-12:40 Regular talk **Katalin Tóth**, Péter Török, Béla Tóthmérész, András Kelemen, Tamás Migléc, Edina Simon, Balázs Lukács, Orsolya Valkó
The role of seed banks in sustaining alkali grassland biodiversity
- 12:40-14:00 **Lunch break**
- 14:00-14:20 Regular talk **Oliver Kienberg**, Thomas Becker
Habitat specific population dynamics and reintroduction success in the threatened steppe-like grassland plant *Astragalus exscapus*
- 14:20-14:40 Regular talk **Lisa Thill**, Oliver Kienberg, Thomas Becker
Compensating extinction by reintroducing *Scorzonera purpurea* into steppe grasslands of Central Germany
- 14:40-15:00 Regular talk **Tamás Migléc**, Orsolya Valkó, Balázs Deák, András Kelemen, Péter Török, Donkó Ádám, Dóra Drexler, Béla Tóthmérész
Sowing dry grassland species by cover crop seed mixtures in Hungarian vineyards
- 15:00-15:20 Regular talk **Michael Jeschke**, Dasom Han, Alexander Konrath, Jessica Mildenerberger, Julia Termeer
How do calcareous grassland cryptogams affect the germination of vascular plant seeds?
- 15:20-16:00 **Coffee break**
- 16:00-17:30 **Poster session 2 with Poster award**
- 17:30-19:00 **EDGG General Assembly ("Muschel")**
- 19:00-22:00 **Grassland Party (Green School/Botanic Garden)**

Monday, 25.05.2015

- 10:30-12:00 **Botanic Garden excursion**
- 12:00-14:00 **Lunch break**
- 14:00-19:00 **Mainz Sand excursion (departure and arrival: bus stop Colonel-Kleinmann-Weg near "Muschel")**
- Evening **Town visit**

Tuesday, 26.05.2015

- 08:00-18:00 **Post-conference trip 1 to Rhine-Hesse (with Grassland Pick nick)**

Wednesday, 27.05.2015

- 08:00-18:00 **Post-conference trip 2 to the Middle Rhine Valley**

Abstracts of talks (in alphabetic order of first author)

T1

Good practices of management of 6210(*) dry grasslands in Molise (Central Italy)

Emanuela Carli, Piera Di Marzio, Carmen Giancola, Attilio Di Giustino, Bruno Paura, Giovanni Salerno, Agnese Tilia, Carlo Blasi

Here we present some results concerning the monitoring strategy of grasslands dominated by *Bromus erectus* and *Brachypodium rupestre* belonging to the habitat 6210(*), one of the ecosystems that host the higher biodiversity in term of animals and plants. We integrated data on dry grasslands in the Molise region from original data, carried out during the project or provided by some of the authors, and partly from the available literature for the Molise region (Biondi et al. 1992, CUM 2002, Di Giustino 2002). We created a database in Turboveg (Hennekens & Schaminée 2001) which consists in around 200 relevés. Plots were placed on the map based on geographic coordinates or they have been georeferenced based on the locality and environmental data. As regards the monitoring, we applied floristic-vegetation indicators (Carli et al. 2013) to evaluate the conservation status (sensu Habitat Directive). The selected indicators highlight the structure of plant communities and the floristic composition, stressing on the peculiarity of the site (Carli et al. 2013).

The analysed grasslands shown some differences in floristic composition. We highlighted three main types, which follow a lithological gradient, tied to the relative proportion of clay and limestone in the substrates. The main differences follow also the geography of the central Italy. The grasslands belonging to *Phleo-Bromion* are mainly in the area of Mainarde (the core of the central Apennines), while pastures recognized as *Bromion* in the mountains of Alto Molise. The Matese mountains (central-southern Apennines), well known to be a peculiar area for the floras that are encountered in this Region (Paura et al. 2010) occupy in an intermediate position between the two main groups.

The conservation of these grasslands requires active conservation, since in most cases they represent secondary grasslands. Our outcomes suggest two main proxies to highlight grasslands in good conservation status. The richness in species of interest (particularly whose natural range includes areas naturally dominated by herbaceous vegetation), which allows to depict grasslands with very high conservation value in term of biodiversity; the environmental characteristics that limit the depth of the soil, and thus the evolution of the vegetation, such as slope and the presence of rocks, which should help in prioritization above all for the environmental management (Carli et al. 2013). Also if these indicators are partially correlated, they respond at different levels of knowledge, as the Habitat Directive requires.

Keywords: Habitat Directive, *Bromus erectus*, Natura 2000, Conservation

T2

Cultural monuments and nature conservation: The role of kurgans in maintaining steppe vegetation

Balázs Deák, Béla Tóthmérész, Orsolya Valkó, Barbara Sudnik-Wójcikowska, Tatyana M. Bragina, Ivan Moysiyenko, Iva Apostolova, Nikolay Bykov, Iwona Dembicz, Péter Török

Steppe is among the most endangered biome in the world. Steppes have been destroyed in the last centuries due to agricultural intensification and afforestation. Nowadays steppe vegetation is often restricted to small fragments generally inadequate for arable farming like ancient soil monuments of the steppe region called 'kurgans'. We collected existing knowledge on kurgans, focusing on their distribution, vegetation and threatening factors, and to highlight the necessity of their effective protection. Despite their small size (generally up to a few hectares), kurgans are characterised by a high microhabitat diversity and play a crucial role in preserving steppe vegetation, especially in intensively managed agricultural landscapes. Kurgans hold endangered desert-, grass-, herb-grass- and forest steppe habitats. They harbour red listed species such as *Adonis vernalis*, *Amygdalus nana*, *Echium russicum* and *Tulipa schrenkii* which are extinct in the surrounding areas. Kurgans represent a unique nature conservation and historical value, but their protection is not guaranteed in most regions. According to our estimations, 250,000 kurgans remained in the whole steppe and forest steppe zone, which is only 20% of their original number. Kurgans are essential for maintaining landscape-scale habitat- and species diversity, and can act as stepping stones and potential core areas for habitat restoration projects.

Keywords: fragmentation, dry grassland, Eurasia, agro-biodiversity, agricultural landscape, restoration

T3

Classification of the psammophytic vegetation of the Don River Basin

Olga Demina, Pavel Dmitriev

Syntaxonomic works devoted to the study of vegetation psammophytic continental sands are characterized by very small geographical coverage, in connection with which there are differences in understanding of the scope of diagnostic combinations. All this as a whole determines imperfection of syntaxonomy psammophytic vegetation and difficulties in allocating many types of communities to a particular alliance or suballiance and often to order. Problems of ecological and floristic classification psammophytic vegetation in the steppe zone stay open, requiring certain syntaxonomical decisions regarding many rank allocated higher vegetation units (Demina 2014).

In decision of syntaxonomical solutions, we are largely focused on the work of Ukrainian colleagues, because Ukraine's territory borders on the Rostov region, settling, like most of the latter, within the Black Sea province.

We have described the community are similar to previously established syntaxons of class *Festucetea vaginatae* Soo em. Vicherek 1972 (syn. *Koelerio-Corynephoretea canescentis* Klika et Klika et Novak 1941), order *Festucetalia vaginatae* Soó Alliance in 1957 and *Festucion beckeri* Vicherek 1972 [Vicherek 1972; Dubyna et al. 1995; Diduh & Korochenko 1996; Dubin et al. 2003; Goncharenko 2003; Gomlya 2005; Tishchenko 2006; Chytry 2010].

Differences in floristic composition due subzonal and regional environmental and phyto-geographical features of the vegetation of sandy massifs Don basin, possible to identify a number of new syntaxons and clarify previously completed construction of syntaxonomic [Demin 2009, 2011; Demin et al. 2010; Demin et al. 2012].

Keywords: Psammophytic vegetation, Don Basin, classification

T4

Diversity patterns in Palaeartic dry grassland vegetation – commonalities and differences across large biogeographic gradients derived from the data of the EDGG Research Expeditions

Jürgen Dengler, Iva Apostolova, Thomas Becker, Idoia Biurrun, Steffen Boch, Iwona Dembicz, Christian Dolnik, Nikolai Ermakov, Monika Janišová, Itziar García-Mijangos, Riccardo Guarino, Anna Kuzemko, Swantje Löbel, Hristo Pedashenko, Mariya Polyakova, Eszter Ruprecht & the participants of the EDGG Research Expeditions

Since 2009, the European Dry Grassland Group organizes annual EDGG Research Expedition (recently renamed to EDGG Field Workshops) to document and analyse scale-dependent diversity-environment relationships of vascular plants, bryophytes and lichens in (dry) grasslands of the Palaeartic realm. The detailed analysis of the data from the first expedition in Transylvania (Turtureanu et al. 2014, *Agric. Ecosyst. Environ.* 182: 15–24) yielded very interesting results. They showed how the relative importance of different environmental drivers (climate, soil, topography, land use, heterogeneity) changes systematically across spatial grain sizes (0.0001-100 m²) and among the three main taxonomic groups in the vegetation.

In this talk, we will present for the first time a systematic overview of the data from six EDGG Research Expeditions (Transylvania, Romania; Podolia, Ukraine; NW Bulgaria; Sicily, Italy; Khakassia, Russia; Navarre, Spain) combined with similar data from Öland (Sweden), Saaremaa (Estonia) and Brandenburg (Germany). The huge climatic and biogeographic gradients covered by these nine study regions together with the standardised sampling along major gradients within each of these allow addressing major questions of community ecology and macroecology based on a unique dataset: (1) Are diversity patterns along regional environmental gradients consistent across the regions or do they vary in relation to large-scale factors? (2) How do vascular plants, bryophytes and lichens differ in their “behaviour” and can this be attributed to their biology? (3) Which are the conditions that support extremely high small-scale species richness (local hotspots)?

Keywords: biogeography, community ecology, diversity hotspot, macroecology, multi-taxon comparison, nested plot, scale dependency, species-area relationship, vegetation plot

Long-term changes in the vegetation of dry calcareous grasslands – evidence from community and population ecology

Martin Diekmann

The vegetation dynamics of dry calcareous grasslands are affected by various ecological factors, including eutrophication, climate change and altered management practices, and to disentangle the relative importance of these effects remains a challenge. Moreover, the magnitude of vegetation changes over the past decades is still unclear, although calcareous grasslands have since long been in the focus of nature conservation in many countries of Central Europe. To understand how and to what extent the general species composition and richness of calcareous grasslands have changed, we can use different lines of evidence: (1) the study of permanent and semi-permanent plots, or an overall comparison of past and more recent plots, (2) the spatial comparison of recent plots differing in their environmental conditions in terms of climate, soil and management, applying a space-for-time constitution, (3) field and laboratory experiments. Such community analyses need to be accompanied by more in-depth studies of single species, for example by quantifying their ecological niches or by conducting population viability analyses.

In my study I review the literature about long-term changes in the vegetation of dry calcareous grasslands, focusing on Western and Central Europe. Compared to most other semi-natural grassland types, the vegetation of calcareous grasslands has remained relatively stable, provided that mowing and grazing intensities have been kept on an appropriate level. However, many dry grassland species appear to have declined over the past decades. The declining species are not a random sub-set of taxa typical for these grasslands, but are characterized by specific traits and ecological responses to important environmental drivers.

Keywords: Climate change, eutrophication, management changes, review, species loss, Western and Central Europe

T6

Effect of grazing on the population structure of *Adonis vernalis* L. in the basin of the Middle Volga

Marina Fardeeva, Tatiana Rogova

Increased grazing in forest-steppe landscapes leads to expansion of dry grasslands and to shift the boundaries of forest and steppe species areas. Steppe species *Adonis vernalis* in the Middle Volga basin at the north border area have suitable habitats in the steppe, forest-steppe and on well-warmed south slopes in dry meadows communities in forest landscapes.

Vegetative shoots at the age of 7-8 year begin the formation of tussock, which size and shape are determined by the different reproductive-age individuals. To analyze the spatial and ontogenetic structure of subpopulations of *A. vernalis* mapping method was used and developed an electronic database. To characterize the point patterns of individuals and groups of plants, whose locations have been identified, the method of construction of the K-function Ripley was used. Significant spatial inhomogeneity of the individuals density of studied subpopulations was due to both biological peculiarities of the species (tussock formation), and external factors: topography, substrate humidity, grazing and competition with other species.

Soil moisture gradient creates clinal pattern of heterogeneity expressed in a gradual increase in the density of plants with increased humidity from the top down the slope. Given the lack of moisture steppe communities, the local population density, with a predominance of prereproductive individuals in a group at the habitats above the bottom of the slope, and domination of tussock generative individuals at the top. In the forest zone with the best warming at the top of slopes at the population density is noted increasing from the bottom up. In this case, the reproductive individuals are concentrated at the bottom.

As a result of grazing habitats spatial pattern of *A. vernalis* populations characterized by marked aggregation of individuals. Resistant to trampling are only large clumps of reproductive plants. Intensity of aggregations and their size depends on the intensity of grazing, as well as on the degree of accessibility some parts of slopes to cattle, due to the nature of the relief. Single prereproductive shoots of *A. vernalis* are most heavily trampled by cattle, simultaneously other grass species trampled also, which leads to a weakening of their competitive pressure and promotes growth of *A. vernalis* curtains. On upland grazing steppe areas most commonly cattle eat prairie grasses, *A. vernalis*, as a poisonous plant, not eaten by cattle, but there are a decrease strength, vitality, and especially the microlocus size of *A. vernalis*; increased intraspecific competition.

Keywords: *Adonis vernalis*, subpopulation, spatial structure, ontogenetic structure, grazing effect

Causes and outcomes of change in species composition of the Apennine semi-natural grasslands in the last fifty years

Eleonora Giarrizzo, Sabina Burrascano, Laura Facioni, Laura Zattero, Carlo Blasi

Semi-natural grasslands are among the most diverse plant communities in Europe, but since their maintenance depends on extensive agricultural practices, these ecosystems are threatened by land use modifications that have massively occurred over the last century, especially in mountain regions. We applied a re-visitation approach to analyze the changes in vascular plant species composition of *Bromus erectus* semi-natural grasslands belonging to the Habitat 6210(*). Our research aims are to: i) quantify and qualify the changes in vascular plant species composition; ii) define the main drivers of the observed changes. In 2014-2013 we re-visited grasslands sites sampled between 50 and 25 years ago across seven study areas along the Apennines (Italy). The historical dataset was composed of 135 phytosociological plots and their associated detailed vegetation maps. The topographic features of the historical plots jointly with the maps' spatial information were used for the designation of the new sampling sites, which were sampled according to the phytosociological method used by the previous authors. We tested for significance the compositional differences between the historical and current vegetation plots through permutational multivariate analysis of variance. In order to quantify the occurred changes, we computed the distances of the new plots from the centroids of the historical groups of plots in the multivariate space. We investigated the direction of change by performing a hierarchical divisive classification in order to associate different physiognomic groups to different patterns of changes. We also compared the abundance and frequency of the diagnostic species of the Habitat 6210(*) between the two sampling periods.

In order to identify the main drivers of compositional changes we used the distances between new plots and the centroids of the historical groups as the response variable in a mixed effect model using as explanatory variables environmental (climate, topography, and soil) and grazing data, and landscape metrics.

Our results pointed out that *Bromus erectus* semi-natural grasslands have changed due to either encroachment by woody species or to a more intense grazing disturbance. These modifications caused substantial changes in the abundance of the diagnostic species of the Habitat 6210(*), with the increase either of unpalatable species, or of those leading to woody communities. Among the drivers of different patterns of changes were data on grazing and landscape metrics. Re-visitation study of vegetation always require a great effort, however, we demonstrated them as a sound strategy to assess changes of species composition in time in semi-natural habitats.

Keywords: multi-temporal data, vegetation dynamics, dry grasslands, Habitat Directive.

T8

EU-LIFE project “Sandy Grasslands”

Pamela Hafner, Holger Rößling

The LIFE Nature Project “Sandy Grasslands” is currently being implemented. From 2013 to 2019 several conservation actions will take place in NATURA 2000 sites mostly located within the Nature Park “Dahme-Heideseen” southeast of Berlin.

Xeric sand calcareous grasslands support a large number of threatened species. They occur on dry, open, calcareous, nutrient poor and well drained sandy soils. Traditional land use such as shepherding, forest clearance and litter utilization supported open habitat types. Increasing intensity of land use, reforestation and the decline of grazing sheep caused grasslands as well as heathland and open forests to diminish. Sandy calcareous grasslands were reduced to small areas. Today Brandenburg is one of the European core areas regarding the geographical distribution of xeric sand calcareous grasslands (*6120). Nevertheless, they are also among the most endangered habitat types in Brandenburg.

This project aims to protect and restore areas where sandy calcareous grasslands of different quality occur or can be developed. Further, the project focuses on heathland and central European lichen pine forests. Important actions of the project are initial mowing and grazing of suitable areas, sod plugging of fallows and the sporadic as well as extensive removal of forests. In especially suitable locations typical and endangered plant species will be reintroduced. Furthermore, the project will work closely with local farmers and land users. Structures, which allow a nature-conservation compliant agricultural use of dry grassland, will be supported. Local farmers and especially shepherds will be provided with infrastructure, such as fencing systems and wells to set up pastures. During the last two years the project implemented several actions. 25 ha of pastures were fenced in. Dense pine forest was removed on app. 3 ha and will be removed on another 9-10 ha during 2015. *Prunus serotina* was removed on app. 9 ha on an inland dune followed by the removal of top soil. Recently the project in cooperation with the owner burned about 5 ha of heathland to improve conditions for new sprouts and small plants of the dry grasslands. Project actions are planned to be implemented in 20 NATURA 2000 areas. Altogether project activities are planned to take place on an area of about 241 ha.

Keywords: LIFE, sandy grasslands, *6120, grazing, reintroduction, land use

T9

Do large scale restoration projects reduce within-species trait variability? A calcareous grasslands case study.

Mélanie Harzé, Arnaud Monty, Grégory Mahy

Dry calcareous grasslands represent local biodiversity hotspots of European temperate regions. They have suffered intensive fragmentations due to the abandonment of traditional agropastoral systems and the resulting encroachment, reforestation, urbanization or transformation into arable lands. In order to preserve and enhance their ecological value, a series of ecological restoration projects have been implemented throughout Europe (LIFE+). As habitats restoration costs can be prohibitive, actions should demonstrate their success. In the face of environmental changes, restored populations should possess attributes necessary for adaptive evolutionary changes allowing them to persist over the long term.

Intra-population functional variability expresses the range of possible trait values of a species living in a heterogeneous environment. It results notably from genetic diversity and phenotypic plasticity and enables species survival, growth and reproduction under various environmental conditions.

In Belgium, three European LIFE projects have taken place between 2000 and 2009, restoring more than 400 hectares of calcareous grasslands. Restorations have mainly been evaluated in terms of plant species diversity and community composition. Though it is expected to be of crucial importance for species evolutionary potential, the restoration of the entire range of environmental heterogeneity and the resulting intra-population functional variability of restored populations have so far not been assessed.

We compared the intra-population variability of functional traits (specific leaf area (SLA) and maximum vegetative height) of 10 restored and 10 reference populations of *Potentilla neumanniana* (30 individuals per populations). We characterized abiotic and biotic conditions by measuring soil depth, sun exposure, bare ground cover and mean vegetation height around each sampled individual.

Our main results showed that the range of within-species functional variability was restored in our study area. We will conclude with implications for the evolutionary potential of restored populations and for future ecological restoration projects.

Keywords: Restoration, functional traits, intraspecific variability, calcareous grasslands

T10

Linking biosystematic, ecological and population-biological approaches in a study of *Tephroseris longifolia* agg.

Monika Janišová

Effective conservation of rare and endangered species is impossible without deep knowledge on many aspects of their existence. Biosystematic research provides information on taxonomic and evolutionary relationships of the studied taxa and their closest relatives. It is inevitable for identification of appropriate conservation objects, placing them within an evolutionary context and indicating up-to date distribution patterns. Species evolution always implies the evolution of its ecological niche and consequently, the quantification of ecological divergence is often helpful in assessing evolutionary history of closely related taxa. Last but not least, the detailed knowledge on species life cycle, biology and conditions increasing its fitness in the natural populations can help to set the proper conservation measures. In a case study focused on *Tephroseris longifolia* subsp. *moravica*, an endemic taxon of European importance, we demonstrate what can the above-mentioned disciplines learn from each other and how the joint knowledge gathered by all of them can be used in the species conservation. *Tephroseris longifolia* agg. is a complex group of outcrossing perennials distributed throughout Central Europe from lowlands to sub-alpine regions in various types of habitats including dry grasslands. The members of this group differ remarkably in ecological amplitudes, geographical ranges and rarity. Morphometric and karyological analyses distinguished six morphotypes corresponding to the recently recognized subspecies, while two morphotypes were distinguished within the nominate subspecies representing the Alpine and the Pannonian populations. The hexaploid level of all morphotypes and the absence of reproduction isolation among them were confirmed. Ecological segregation of morphotypes reflects their morphological and karyological differentiation suggesting that interspecific ecological differentiation played important role in the group evolution. For the endangered subspecies *T. longifolia* subsp. *moravica* demographic characteristics were estimated (population abundance and its relation to weather parameters, seed set and its damage by granivorous insects, germination percentage and germination time, seed bank longevity and density, seedling establishment and survival, parameters of taxon ontogenetic development and longevity of individual stages, incidence of first flowering, impact of disturbance on the taxon' life cycle, etc.) which could be relevant for its conservation in situ. The financial support was provided by the Millennium Seed Bank Project (Kew, Great Britain) and VEGA 2/0027/15.

Keywords: conservation, co-occurring species, demography, ecological niche, rarity, taxonomy

T11

Effect of summertime burning and livestock grazing on plant species composition and diversity, in a dry grassland in Quchan, Iran

Mohammad Jankju, Zakieh Ghasemi Mayvan, Mansoor Mesdaghi

Wildfire burning may have significant effects on the structure and composition of dry grasslands. A semi-arid steppe grassland, in NE Iran, 20 km far from Turkeminstan border, had experienced a summertime wildfire in 2012. We established 8 line transects at four adjacent habitats; i.e. protected without fire (POF), protected with fire (PWF), grazed without fire (GOF), and grazed with fire (GWF), during spring and summer 2013. Along each transects, 10 quadrates (1 m²) were established, in which plant composition, density and canopy cover were recorded for all species. Analysis of data was performed to measure the species diversity based on the species abundance. Calculation of species diversity, richness and evenness was performed by R and Ecological Methodology software's. Summertime burning reduced species diversity, but the effects were more profound on the grazing rather than enclosure sites. Geophytes and Therophytes were increased, but Chamaephytes and Hemi-cryptophytes were reduced in the burnt sites; same results were found under the livestock grazing site (POF). In conclusion, although a summertime burning may cause negative impacts on the composition and diversity of dry grasslands but its effect may be partly ameliorated by the management strategies, i.e. protection of burnt sites from livestock grazing.

Keywords: Richness, Evenness, life form, summer burning

T12

How do calcareous grassland cryptogams affect the germination of vascular plant seeds?

Michael Jeschke, Dasom Han, Alexander Konrath, Jessica Mildenberger, Julia Termeer

Most vascular plants species characteristic for calcareous grasslands can only germinate in microsites with favorable light conditions. Light availability at the soil level of semidry and dry grasslands is also suitable to form a dense cryptogam layer that can inhibit seed germination.

In a series of greenhouse experiments, we test (I) which cryptogam and seed traits determine the fate of vascular plant seeds in calcareous grasslands. We also want to differentiate between (II) the barrier function of cryptogams which block the seeds from reaching the soil and (III) the reduced light quality below the cryptogam layer.

(I) Seeds of 36 vascular plant species were sown into plots covered by nine different cryptogam species. Results showed reduced germination under cryptogam mats, depending on cryptogam species and seed traits. High moss mats and fruticose lichens showed the strongest inhibition, especially for seeds with appendices. In contrast, large rounds seeds from shrub species showed increased germination rates in cryptogam mats.

(II) In order to test for the barrier function of cryptogam mats and cushions, we dropped seeds from 20 vascular plant species in mats of five characteristic cryptogam species from their natural shedding height. Most seeds were not able to reach the soil but remained in the cryptogam layer. Seed penetration depth was correlated with terminal velocity of the seed and negatively correlated with the presence of seed appendices.

(III) To test for the effect of light interception by the cryptogam layer we placed the seeds of 5 vascular plant species below mats of 6 cryptogam species. A part of the cryptogam mats were treated with a bleaching agent to remove all organic compounds affecting light transmission. Light spectra were measured below intact and treated cryptogam mats with a portable spectrometer. The spectra of untreated cryptogams showed a strongly reduced light quality, e.g. in the red/far red ratio, which directly affects germination of seeds. Plots covered by intact cryptogam mats showed lower seed germination rates than plots covered by bleached cryptogam mats.

Strong effects of light absorption and barrier effect could be shown on almost all plant species. We conclude that the species composition of the cryptogam layer can strongly influence germination of seeds depending on their specific traits, and thereby affect succession pathways of open grasslands.

Keywords: calcareous grasslands, germination, mosses, lichens, inhibition, facilitation

T13

Biogeography of Rhine Gorge Orophytes

Joachim W. Kadereit

The Rhine Gorge area, comprising the Middle Rhine, Nahe, Mosel and Ahr valleys, harbours a small number of flowering plant species with distribution centres in the Alps and other European high mountain areas. We attempted to understand the biogeographical history of some of these species using molecular methods. In case of *Amelanchier ovalis* and *Rumex scutatus* we found that the Rhine Gorge material is more closely related to SW European populations than to geographically closer populations from the Alps. In case of *Sempervivum tectorum* we hypothesize that the Rhine Gorge material represents a homoploid hybrid species between *S. calcareum* from the SW Alps and *S. tectorum* from the C Alps. The same two species apparently gave rise to a polyploid hybrid species in the French Massif Central.

Principally, the disjunct distribution ranges in the Rhine Gorge can have originated by long-distance dispersal or through vicariance, i.e., fragmentation of formerly continuous distribution areas. Examples from *Sempervivum* and *Adenostyles* will be used to illustrate that both these processes have shaped the extant distribution of Alpine plant taxa.

Habitat specific population dynamics and reintroduction success in the threatened steppe-like grassland plant *Astragalus exscapus*

Oliver Kienberg, Thomas Becker

Astragalus exscapus is an endangered plant species and a part of the unique relict flora of steppe-like grasslands of Central Europe. The species exists in a variety of continental grassland communities, which can be divided into the “primary” habitat type of dry grasslands (or steppe grasslands strictu sensu) and the “secondary” habitat type of semi-dry grasslands. We investigated the stage structure and dynamics of *A. exscapus* in 22 natural populations (12 dry and 10 semi-dry grassland sites) in its whole range in Germany. We also conducted reintroductions of *A. exscapus* in eight sites of its former range in the Thuringian Basin, where in each site half of the individuals were planted in dry or in semi-dry grassland plots, respectively.

The structure of size-based stages differed significantly between semi-dry and dry grassland populations. While populations in semi-dry grassland sites consisted of more small flowering plants and also of more adult vegetative plants, proportion of large flowering plants was higher in dry grasslands. Proportion of juvenile plants was low, but higher in sites with more open ground and shorter vegetation height. Population dynamics in dry and semi-dry grassland sites were also distinct. Small populations in dry grasslands had higher population growth rates than small populations in semi-dry grasslands. Also, the three populations with a considerable proportion of adult vegetative plants that were only found in semi-dry grasslands had very low population growth rates. In large populations however, there was no difference in population growth between the two habitat types. Population size in general had a positive effect on population growth in both habitat types, while the correlation was stronger in semi-dry grassland populations.

The initial size of the reintroduced plants was significantly higher for individuals which originated from dry grassland populations. This was particularly important as initial size had a significant effect on survival, growth and flowering probability of the reintroduced plants even three years after they were planted. However, the type of the target habitat had no significant effect on the reintroduction success of *A. exscapus*.

We conclude from our results that threats for *A. exscapus* are habitat-specific. In dry grassland sites, even small populations may maintain themselves. In contrast, in semi-dry grasslands survival chances of *A. exscapus* depend highly on large individual numbers and ongoing succession is a far more certain threat.

Keywords: population structure, demography, reintroduction, relict species

T15

Summer Dormancy in Mediterranean perennial grasses

Jaime Kigel

The growth-cycle of perennial grasses from regions with a Mediterranean climate is characterized by an active phenophase during the mild, rainy winter and spring, followed by a resting phase during the hot, dry summer. The physiological control of the summer resting phase, as well as the environmental factors involved in its imposition or induction differ among different grass species: summer rest is enforced by drought (i.e. plants grow in the summer if watered; e.g. *Hyparrhenia hirta*, *Festuca arundinacea*), or induced (true summer dormancy, i.e. dormant even if watered during the summer, e.g. *Poa bulbosa*, *Dactylis glomerata*, *Phalaris aquatica*, *Hordeum bulbosum*). True dormancy is gradually relaxed during the summer. In some perennial grasses summer dormancy is associated with flowering, since it depends on the production of regeneration buds that develop on corms formed at the base of elongated, flowering tillers (e.g. *Hordeum bulbosum*, *Phalaris aquatica*), while in other grasses winter re-growth occurs from arrested vegetative tillers. In *Poa bulbosa* summer dormancy is associated with the production of a basal dormant bulb and extreme dehydration tolerance. In contrast, in other summer dormant grasses a relatively high hydration level is maintained during the summer in regeneration buds or in meristems of vegetative tillers. In *Poa bulbosa* summer dormancy is induced by environmental factors associated with the arrival of summer conditions: longer days, higher temperature and increasing water deficit. However, in other perennial grasses long days and high temperature did not induce dormancy. Thus, different combinations of traits and environmental cues result in an eco-physiological continuum in the adaptation of perennial grasses to summer drought and increasing aridity in Mediterranean regions.

Keywords: perennial grasses, semi-arid, summer dormancy

Dry grasslands of the National nature park “Pyryatynsky” (Ukraine): syntaxonomy, florotopology and rare plant species

Oleksii Kovalenko

Dry grasslands are important reserve of the species diversity of the National nature park (NNP) “Pyryatynsky”. However, it is one of most endangered type of vegetation. Successful conservation of dry grassland is impossible without its complex study.

We presented data of original research of dry grassland of NNP in 2008-2014. We sampled more than 460 full fitosociological reveals and analyzed it in the program Vegclass. v. 1.0. In the florotopology system dry grasslands belong to 4 major floristic complexes. Steppe meadows are part of the Pratophyton and count 224 plant species. Margantophyton includes microfloristic complexes of edges of pine (127 species) and broad-lives (216 species) forests. We fixed 289 plant species in the Steppophyton that divides into shrubs (79 species), meadow (254 species) and sand (112 species) steppes. The Psammophyton is presented by floristic complex of fluvial sands (144 species). According to Braun-Blanquet-approach communities of dry grasslands belong to 15 association, 6 alliances, 4 orders and 4 classes. Mesoxeric grasslands of sandy soils we classified as *Festuco valesiaca-Agrostietum vinealis* and *Agrostio vinealis-Calamagrostietum epigei* (*Molinio-Arrhenateretea*). Communities of the dry forest edges belong to *Trifolio alpestris-Geranietum sanguinei* and *Geranio sanguinei-Peucedanetum cervariae* (*Trifolio-Geranietea*). Steppe vegetation is presented by the class *Festuco-Brometea*, the order *Festucetalia valesiaca*, the alliances *Festucion valesiaca* and *Fragario viridis-Trifolion montani* and 7 associations. Also we determined 4 associations from class *Festucetea vaginatae* (*Linario odora-Agrophyretum dasyanthi*, *Veronico dilenii-Scaletum sylvestri*, *Thymo pallasiani-Centauretum sumensis* and *Antylidi macrocephalae-Festucetum valesiaca*). Steppe meadows are habitat for 2 rare plant species (*Anemone sylvestris* and *Jurinea charcoviensis*). Shrubs steppe includes *Adonis vernalis*, *Crataegus ucrainica*, *Scilla bifolia*, *Cerasus fruticosa* and *Lathyrus lacteus*. Meadow steppes count 22 rare plant species, such as *Astragalus dasyanthus*, *Iris hungarica*, *Crocus reticulatus*, *Bulbocodium versicolor*, *Stipa capillata*, *Pulsatilla bohémica* and others. Sandy steppes are reserve for *Stipa borysthénica*, *Linaria dulcis*, *Iris pineticola* and others. We studied structure of 7 species populations. The populations of *Astragalus dasyanthus* and *Bulbocodium versicolor* are small size with low values of number and density, absence of some age stages and depressive type of vitality structure. *Pulsatilla bohémica*, *Stipa borysthénica* and *S. capillata* form stable all-stage populations in different types of dry grasslands, meanwhile *Jurinea charcoviensis* and *J. pseudocyanoides* demonstrate great fluctuation of population structure parameters according to ecological conditions and level of human pressure.

Keywords: syntaxonomy, rare plant species, dry grasslands, Ukraine, NPP "Pyryatynsky"

Syntaxonomy of the sandy and rocky grasslands of Ukraine: preliminary results of large-scale analysis

Anna Kuzemko, Dmytro Dubyna, Tatiana Dziuba, Ivan Moysiienko, Yulia Vasheniak, Maryna Zakharova

At the present stage of phytosociology the syntaxonomic structure of sandy and rocky vegetation in Europe is the topic of heated discussions. There are different opinions concerning the affiliation of its communities to different classes — *Koelerio-Corynepherea*, *Festucetea vaginatae*, *Sedo-Scleranthetea*, as well as on the volume and the relations of these classes, syntaxonomic status of orders and alliances in their composition. The aim of our work is a large-scale analysis of the target vegetation types for the territory of Ukraine on the basis of modern methods of phytosociological studies and solution of the controversial issues of their syntaxonomy. In total were used 4497 relevés of grassland vegetation from Ukrainian Grassland Database (GIVD code EU-UA-001) which were performed with TWINSpan (modified). At each stage of analysis we checked the level of clusters homogeneity using indices of Total Inertia, Euclidean Distance, and Whittaker Beta-Diversity. Peculiarities of ecological differentiation of syntaxa were determined using DCA ordination in R-project software (integrated in JUICE). At the first stage of analysis were separated 943 relevés of sandy and rocky grasslands for further analysis. It was revealed that studied vegetation represented by communities of four classes: *Koelerio-Corynepherea*, *Festucetea vaginatae*, *Ammophiletea* and *Cakiletea maritima*. The first class includes two subclasses. The vegetation of rocky outcrops belonged to the *Sedo-Scleranthetea* subclass with two orders: *Alyso-Sedetalia* (on carbonate outcrops) and *Sedo-Scleranthetalia* (on granite outcrops). Vegetation of continental sands assigned into the *Koelerio-Corynepherea* subclass, which includes two orders: *Corynephetalia canescentis* (on acidic sands of the fluvioglacial sediments in the northern part of Ukraine) and *Sedo acris-Festucetalia* (communities of neutral riverine sands in the Forest and Forest-Steppe zones of Ukraine). The *Festucetea vaginatae* class includes communities on the sands of various origins in southern Ukraine. This class is represented by one order *Festucetalia vaginatae*, although taking into account degree of internal differentiation of the class, we do not exclude possibility to describe a new orders within the class. The *Ammophiletea* includes vegetation of coastal dunes and includes one order *Elymetalia arenarii*. Communities on strandlines of sandy and shingle beaches belonged to the *Cakiletea maritima* class with one order *Euphorbietalia peplidis*. The aforementioned syntaxonomic decisions are confirmed by the results of DCA-ordination, which proves the leading role of soil reaction in ecological differentiation for the syntaxa of studied vegetation at the higher level.

Keywords: *Koelerio-Corynepherea*, *Festucetea vaginatae*, *Ammophiletea*, *Cakiletea maritima*, Ukraine

Habitat preference of German Mantis *religiosa* populations (Mantodea) and potential conservation measures

Catherine Anne Linn, **Eva Maria Griebeler**

"The praying mantis (*Mantis religiosa*) is an endangered insect species in Germany. This thermophilic species inhabits dry grasslands and is often found on fallow ground following viticulture. The species is currently expanding its distribution range northwards from the Mediterranean and south eastern Europe. This range expansion into Central Europe is most probably caused by global warming. Here, we studied habitat requirements of *M. religiosa* needed by the species to complete the life cycle within a year. Such information is a prerequisite to implementing successful conservation measures for a species.

At two study sites in south western Germany, which were subject to different conservation measures (grazing in July and August, cutting of the vegetation by a clearing saw to 30cm in June and July), we recorded structural and climatic conditions within their different microhabitats. We also performed capture-mark-recapture experiments with adult *M. religiosa*, and mapped microhabitats chosen for adult roosting, ootheca deposition, ootheca hatching and imaginal moulting. In order to assess structural and climatic preferences during the life cycle of *M. religiosa* we calculated the Lille habitat preference index and conducted logistic regression analysis for life stages (habitat model).

Our results suggest that temperature is important for egg and larval development of *M. religiosa*. For egg deposition, females preferred solid substrates with high heat storing capacities (such as dry stone walls) as those attenuate the negative influence of cold weather periods on egg development. As an ambush predator, males and females preferred roosting sites with sufficient shelter and high prey abundance such as flowering plants. Both sexes avoided blank earth.

Unexpectedly, conservation measures implemented at the study sites harmed both *M. religiosa* populations as they reduced population sizes and reproduction (number of oothecae deposited). Based on our results on habitat requirements of *M. religiosa* we suggest that mowing during the adult phase of *M. religiosa* (July - October) should reduce vegetation height to a moderate level as this keeps prey abundance high. Mowing with a clearing saw or grazing over a short period in small fenced areas should be preferred over prolonged grazing, as grazers collaterally stamp down the vegetation. Grazers indirectly reduce prey availability as they deteriorate microclimatic conditions."

Keywords: capture-mark-recapture study, temperature, vegetation height, Lille habitat preference index, habitat model

T19

The impact of livestock grazing on plant species composition and diversity in arid steppe of Algeria

Saifi Merdas, Mohamed Tahar Hanafi, Bachir Sakaa, Toufik Mostefaoui, Yacine Kouba, Salemkour Nora, Ahmed Menad

A deep understanding of grazing effects on plant diversity and composition in Mediterranean arid steppe is still missing, despite an extensive theoretical background. This study examines the effects of livestock grazing on plant communities of the Algerian arid-steppe (the basin of Hodna). We compared alpha and beta diversities -both quantified using the Hill Index- between grazed and un-grazed areas and used the additive partitioning of beta diversity to test whether the difference in plant species composition is due to species spatial turnover or nestedness. Besides, we examine the effects of grazing on beta diversity at two spatial scales (i.e. among-transects, among-sites). For alpha diversity, grazing reduced significantly the diversity of the annuals species, but the perennial plants tended to be less affected by grazing. The results revealed a significant compositional difference between grazed and ungrazed areas, ~74% of the overall beta diversity was due to species turnover and ~26% was due to nestedness. The analysis of beta diversity at different scales showed that grazing increased compositional divergence at small scale and decreased beta diversity at coarse scale (among-sites). These results suggest that grazing affects mainly the annual plants and affects plant diversity differently across spatial scales; which implies the conservation of important number of sites.

Keywords: Nestedness, turnover, beta diversity, alpha diversity, Mediterranean basin

Sowing dry grassland species by cover crop seed mixtures in Hungarian vineyards

Tamás Miglécz, Orsolya Valkó, Balázs Deák, András Kelemen, Péter Török, Donkó Ádám, Dóra Drexler, Béla Tóthmérész

Cover cropping becomes increasingly integrated both in conventional and organic viticulture. With the use of cover crops we can overcome high priority problems such as soil erosion, weeds, decline of soil fertility and soil microbial activity, mitigate vineyard cultivation and support a sustainable way of viticulture. Mainly non-native or low diversity seed mixtures are used which contains some grass, grain or legume species. By sowing high diversity cover crop seed mixtures of native species typical to dry grasslands we could also improve the biodiversity and ecosystem services of vineyards. In our study we evaluated two high diversity cover crop seed mixtures in on-farm field trials involving three vineyards of Tokaj vine region. In March, 2012 two seed mixtures were sown: Biocont-Ecowin (commercial, 12 species), and Grass-forb (composed for the study, 16 species) seed mixture. We recorded the percentage cover of sown and unsown (weed) species in late June, 2012, 2013 and 2014. The commercial seed mixture established better during the first year, but for the second and third year, we recorded higher percentage cover of sown species in inter-rows sown with Grass-forb seed mixture. During the first year, cover of weed species was higher in Grass-forb seed mixture inter-rows, but for the second and third year we recorded higher weed cover scores in Biocont-Ecowin inter-rows. All sown species established in each site, however some species established only with low cover, or was not present in every year. For example the cover of dry grassland species sown in Grass-forb inter-rows: *Achillea millefolium*, *Centaurea jacea*, *Festuca rupicola*, *Galium verum*, *Salvia nemorosa* and *Silene vulgaris*, or annual species sown in Biocont-Ecowin inter-rows: *Fagopyron esculentum*, *Phacelia tanacetifolia*, *Daucus carota*, *Sinapis alba* which established during the first year, but disappeared for the second and third year. According to our results, Grass-forb seed mixture performed better as a permanent cover crop, but if our aim is to create a temporary cover crop, than Biocont-Ecowin seed mixture is a better solution. Establishment of dry grassland species was rather poor in our plots, but outside the plots, we could find some individuals during the study. Our attempt to establish permanent cover crop vegetation was successful, but neither seed mixture was optimal. Accordingly, there is a need to test new mixtures, with different composition to find the best solution.

Keywords: ecological farming, agro-biodiversity, biodiversity, soil protection, weed management

T21

Population biology of an in situ Pleistocene survivor

Nina Šajna, Jelka Šuštar-Vozlič, Mitja Kaligarič

Nunatak survival theory has been rarely used to explain phylogeographic patterns in temperate mountain ranges because such survivor species could often not retain the molecular information of in situ survival as a consequence of later hybridization with populations surviving elsewhere. Furthermore, if a species survived in a nunatak, this should be recognized also by its current distribution pattern and ecology. All this makes nunatak survivors valuable case studies, from which we could gain knowledge about evolutionary history, the role of Quaternary climatic oscillations (retreat to glacial refugia or restrictions to nunataks and postglacial colonisation), and ecological characteristics of narrow endemic Tertiary lineages.

We studied population biology of *Hladnikia pastinacifolia* Rchb. (Apiaceae), a monotypic endemic, found in a pre-Alpine (sub-Mediterranean) mountain in SW Slovenia. Our findings suggest that the studied species is a nunatak survivor. This conclusion is based on the narrow range size (less than 4 km²), on fragmented distribution in the near proximity of believed nunatak and on results we obtained by molecular studies, which are showing taxonomic distinctness and extremely low genetic diversity among populations. Survival in situ is additionally backed by palaeoendemism of *H. pastinacifolia*, its rarity as well as temporal persistence. Further, we are going to discuss in more detail apparent contradiction between *H. pastinacifolia* rarity and lack of specific habitat preferences by presenting results about traits related to dispersal and persistence, especially focusing on the distribution of seedlings in nature, implying dispersal potential, and germination behavior.

Keywords: Nunatak survival, endemism, *Hladnikia pastinacifolia*, rarity, persistence, sub-Mediterranean, mountain, rocky grassland

Compensating extinction by reintroducing *Scorzonera purpurea* into steppe grasslands of Central Germany

Lisa Thill, Oliver Kienberg, Thomas Becker

Scorzonera purpurea L., Purple Viper's Grass, is a long-lived perennial characteristic for continental steppe grasslands. Its range reaches from Western Siberia to Central Europe, where the species occurs with small relict populations in isolated steppe grassland exclaves. These populations are the remnants of a larger range during the Pleistocene which were fragmented due to postglacial climate change. As a natural heritage they are of high scientific and conservation value. In the past, the species was more common in Central Germany, i.e. the Thuringian Basin and south Saxony-Anhalt, but it has declined severely over the past 100 years: in 2013 28 remnant occurrences (of formerly at least 82 occurrences) were found in the study region. These populations were – with some exceptions – located in the Kyffhäuser Mountain area in Thuringia. An analysis of the species' extinction events revealed habitat fragmentation and isolation as well as the decline of habitat quality as the main reasons for decline. Isolated habitats that are still suitable for the species cannot be recolonised or newly colonised anymore due to distances that are too large. In this situation, reintroductions of the species into suitable habitats are a way to compensate extinctions. We conducted reintroductions of *S. purpurea* in six steppic grassland areas in the Thuringian Basin, Germany. A total of 864 juvenile plants of *S. purpurea* were reintroduced in autumn 2010, and growth, survival, and flowering were monitored annually until 2014. In this time, 56 % of reintroduced plants survived. Generalised linear mixed models revealed that reintroduced *S. purpurea* plants survived significantly better on south-facing slopes and plants from small populations had a higher chance of survival as well as plants that had more leaves in the greenhouse prior to planting. In addition, the coverage of the moss layer and the amount of open ground influenced survival positively. Flowering rate was negatively influenced by coverage of the herbaceous layer and positively by the size of plants prior to planting. Size of plants increased with the year after planting. Plants that were larger when planted out remained larger until 2014 as well as plants originating from small source populations. In addition, plants on steeper slopes and in blocks with less herbaceous cover were larger as well.

Our study shows that habitat fragmentation is a major risk for extinction of *S. purpurea*, and that reintroductions may prevent the species' extinction.

Keywords: extinction analysis, monitoring, planting, rare plant, population size, habitat effect

The role of seed banks in sustaining alkali grassland biodiversity

Katalin Tóth, Péter Török, Béla Tóthmérész, András Kelemen, Tamás Miglécz, Edina Simon, Balázs Lukács, Orsolya Valkó

We studied the vegetation, soil seed banks and environmental factors in three alkali grassland associations: *Artemisio santonici-Festucetum pseudovinae* dry alkali grasslands at highest elevations; *Puccinellietum limosae* at medium elevations and *Agrostio stoloniferae-Caricetum distantis* at the lowest elevations. We tested the following hypotheses: (i) Both species diversity in the seed banks and seed density are the highest in the most stressed grassland type (ii) Seed density of hygrophytes increases with decreasing elevation. We detected a mean seed bank density ranging from 30 104 up to 51 410 seeds/m², which was higher than in most dry grasslands. The findings did not support our first hypothesis; both the lowest seed bank diversity and seed density were detected in the most stressed *Puccinellietum limosae* grasslands, where *Spergularia salina* and *Juncus compressus* were the only abundant seed bank species (possessing at least 1 000 seeds/m²). We detected the highest seed densities of the hygrophyte species in the lowest-elevated *Agrostio stoloniferae-Caricetum distantis* grasslands. The results partly supported the second hypothesis; most of the hygrophyte species were missing from the seed bank at the medium-elevated, but most saline *Puccinellia* grasslands. We detected more species in the seed banks than in the aboveground vegetation which underlines the importance of seed banks in sustaining the diversity of alkali grasslands. However, most of the graminoid species possessed no considerable seed bank, except for *Juncus compressus* (up to 38 619 seeds/m²). Our results suggest that persistence and establishment of most alkali grassland species are not supported by the local seed banks.

Keywords: halophyte, hygrophyte, persistence, salt content, water content

Wildfires as drivers of lekking distribution of Great Bustard (*Otis tarda*) – Implications for nature conservation

Orsolya Valkó, Balázs Deák, Béla Tóthmérész, Péter Török, Sándor Konyhás, Zsolt Végvári

Great bustard (*Otis tarda*) is a strictly protected ground-breeding bird of open landscapes where fire has been a part of the natural disturbance regime since historical times. The Great Bustard is a lek-mating bird: male birds aggregate to perform competitive displays. For effective conservation of great bustard populations, it is crucial to study lek site preferences of the species. We analysed the importance of fires on the spatial distribution of lekking bustards controlling for habitat types, habitat diversity, grazing intensity, distance from roads and social effects. Great Bustard data were collected at Hortobágy National Park (East-Hungary) which is among the biggest open landscapes in Europe comprising dry grasslands, wet meadows and marshes. Our standardized dataset spanned 31 years, being one of the largest datasets on bustard lekking. During the 31 years we observed 10,118 individuals at 639 observation points. The most important predictor for total number of birds and number of males was the area burnt in previous years. We found that increased habitat diversity had a negative effect on male numbers and total numbers, but supported higher female numbers. Models fit on second- and third-year burn data detected no substantial role of burning on lekking distribution. Our findings revealed that fire is an important driver in shaping lekking distribution of great bustards in the natural breeding areas of this endangered species. Enhanced lek site quality in recently burnt areas can attract displaying males from suboptimal habitats. Birds can be attracted to nature reserves from the neighbouring unprotected areas, where they are threatened by a high level of human disturbance (e.g., traffic, agricultural activities or power lines). Based on our results, we assume that besides conventional management techniques (grazing of lek sites), controlled application of fire would improve the effectiveness of conservation efforts. In mosaic landscapes, patch-burning management with a mosaic application of fire and grazing could be successfully used for providing optimal lek sites for Great Bustards.

Keywords: ground-breeding bird, habitat selection, habitat management, spatial analyses, prescribed burning, alkali landscape

Abstracts of posters (in alphabetic order of first author)

P1

Impact of topographic factors in the abundance of grasses in semi-steppe (Case study: North of Iran)

Mousa Akbarlou, Fazeleh Mortazavi, Adel Sepehry

Presence and distribution of plant communities in ecosystems is not random. Climate, soil, topographic and human factors have basic role in species distribution. Therefore, according to key role of plants in ecosystem balance necessity of recognizing relationships between plants and environmental factors is not avoidable for its consistency. In this study effect of latitude factors on grasses grope abundant in dry grassland the north of Iran were investigated. Chaharbagh Gorgan is located between latitude of 36°38'27" to 36°40'30"N and longitude 54°31'48" to 54°33'36"E. The elevation ranges between 2100-3150 m and the environment is a cold semi steppe. The dominant plants are *Agropyron intermedium* Host, *Festuca ovina* L, *Bromus tomentellus* Boiss and *Onobrychis cornuta* L. 36 study units were selected by overlay topographic map. Sampling points in the field area find by GPS. Canopy and density species was measured in 1m² plots at full flowering stage of growth during summer 2014. Analysis of variance (ANOVA-one way) was done using a random design method with unequally replications. Statistical analysis shows that Grasses abundance was a significant difference between the elevation levels ($P < 0.05$). The abundance of grasses depending on the topography of the area is different. So the abundance of grasses increased with increasing altitude. Most abundant grasses at 2400 to 2800 meters. The most abundant grasses in the northern and western aspect and 12-45% slopes. Overgrazing and rangeland degradation can be a major cause of turbulence is the locally ecosystems.

Keywords: Grasses, abundance, semi steppe, altitude, aspect, slope

Germination capacities and ecological requirements of *Teucrium polium* native medicinal and endangered species in Hail region (North of Saudi Arabia)

Ahmed Alghamdi, Naser Ibrahim, Saleh Eid, Khalil Mseddi

Teucrium polium L., Lamiaceae family and known as "Jaada", was one of the most used plant for many medicinal and aromatic purpose by the local population in Hail region (North of Saudi Arabia). Uprooting by people plant collectors, overgrazing and drought climate were behind the disappearance of *Teucrium polium* in their native regions. The objectives of this research were to study the germination capacities and the ecological requirements of *Teucrium polium*, a native medicinal and endangered species in Hail region (North of Saudi Arabia).

The germination requirements of *Teucrium polium*, were studied under control conditions in the laboratory. The treatments included four light levels (0:24); (6:18); (12:12) then (24:0) hours of light : dark period, seven salinity concentrations (0, 2, 4, 6, 8, 10 and 12 g/L NaCl), as well as seven temperature regimes (5°, 10°, 17°, 15°, 20°, 25° and 30°), using a completely randomized block design. In the field water use efficiency and tolerance to salinity were studied along with different systems of irrigation. This cooperated work realized between the laboratory of botany (College of Science, Hail) and the Seed Multiplication Station (Ministry of Agriculture, Hail) enhance the save and the protection of *Teucrium polium*, an endangered medicinal plant.

Keywords: Germination, ecological requirements, *Teucrium polium*, endangered, Hail

Study of seed germination parameters of *Sanguisorba minor* under different thermal treatment for restoring semi-arid rangelands

Reyhane Azimi, Mohammad Jankju, Mohammad Kia Kianian, Vajihe Khaksarzade, Valiollah Raoofi, Fatemeh Naghizade

Common burnet (*Sanguisorba minor*) is a perennial herb from Rosaceae family (Rosaceae), which is used to restore the degraded rangelands. This perennial herb has erect stems, with deep root systems (70-100 cm), and tolerant to freezing, and drought stresses. The present study was conducted to study the seed germination parameters of common burnet under different thermal treatments as completely randomized design in 4 replication in 2013. Treatments involved the effects of constant temperature of 5, 10, 15, 20, 25, 30, 35, 40 and 45° C on seed germination and seedling growth. Results showed that the effects of different thermal treatments on seed germination of common burnet were significant with the lowest germination speed of 2.26 seeds a day was obtained at 5°C and the highest germination speeds of 8.3 and 5.63 were obtained at 5 and 10°C. The longest plumule occurred at constant temperatures of 10° (4.94 cm) and 15° (4.47 cm) and those of shortest ones occurred at 35 and 45° (1.28 and 0 cm respectively). The longest radicle lengths also were observed at 10° (5.13 cm) and 15° (5.05 cm) and those of the shortest ones occurred at 35 and 45° (0.88 and 0 cm respectively). According to fitted regression models between germination speed and temperature, the values of minimum, optimum and maximum temperatures were obtained at ranges of 3.38-6.65, 26.82- 34.5 and 45- 46.78°C respectively. According to the seed germination of the studied plant at maximum and minimum temperatures, it can be used in restoring semi-arid rangelands.

Keywords: *Poterium sanguisorba*, germination, temperature, cardinal temperature, regression models, pastures, arid and semi arid areas

Biodiversity and ecological status assessment of Birds in Algerian steppe region

Ettayib Bensaci, Noudjoud Aissani, Menouar Saheb, Yacine Nouidjem, Asma Zoubiri, Moussa Houhamdi

Algerian Hauts Plateaux characterized mainly by steppe landscape over more 20 million hectares(8.4 % of surface of Algeria). The steppe of Algeria has semi-arid and arid climate characterized by alternating wet and dry seasons and average annual rainfall lower than 400 mm. The strategic situation of Algerian steppe between coastal plains and Sahara, lets it plays a key role in the breeding, wintering and migration of many birds species in the Palearctic. We investigated birds diversity and their ecological status in the steppe of El Hodna region from September 2007 to July 2012.

Overall, 97 species were recorded dominated mainly by Turdidae (16 species), Alaudidae (10 species) and Sylviidae (09 species). Biogeographically birds are dominated by western Palaeartic species according to the faunal types, whereas the migrant phonological status is the dominant than breeding and passage status.

Our contribution aims to give an assessment of avian populations of steppe regions with emphasis on some ecological status (faunal type, phenological status, trophic category and protection state). Also to show the importance of these ecosystems for the conservation of bird species through the year.

Keywords: Biodiversity, ecological status, Birds, steppe, Algeria

The Growth Dynamics of Steppe Shrubs in the European Forest-steppe (Tula region)

Olga Burova, Elena Volkova

The afforestation of forest-steppe part of Tula region is less than 2%. The steppified oak forests are formed on watershed slopes and in ravines. They occupy from 5 till 35 ha. The shrub communities (*Amygdalus nana*, *Cotoneaster alaunicus*, *Spiraea crenata*, *Lonicera tatarica*, *Cerasus fruticosa*, *Prunus spinosa*, *Rhamnus cathartica*, *Rosa majalis*, *Chamaecytisus ruthenicus*) are formed on the periphery of such forests. The study of the biology of shrub species is carried out on the territory of the Museum-reserve "The Kulikovo Field". For this purpose in 2005 the cuttings of these shrubs were planted in plots of 10 x 10 m. The size of the cuttings was 50-60 cm. The monitoring of the shrub cuttings was performed 5-6 times in the season (April - September) and measured the following parameters: the height and width of the stem, the length of the branches, the seasonal growth of branches, size of internodes, leaves, buds, inflorescences and fruits. After 6 years the cuttings grown up to adult plants. The most intensive growth is characterized for *Rhamnus cathartica*. *Prunus spinosa* has intensive growth also, but the branches are eaten by *Lepus europaeus* and leaves damaged by insects (Aphididae). The *Cotoneaster alaunicus* has the most wide shrubs. The branches of *Lonicera tatarica* are characterized by a maximum length of internodes, and *Amygdalus nana* – the maximum length of the leaves. *Chamaecytisus ruthenicus* has the lowest intensity of growth. A vigorous vegetative reproduction is typical for *Cerasus fruticosa*. *Cotoneaster alaunicus*, *Spiraea crenata*, *Cerasus fruticosa* and *Rosa majalis* are characterized by irregular fruiting every year.

Keywords: forest-steppe landscape, restoration, shrub vegetation

Restoration of oak forest steppe-sand grassland mosaic in Hungary in an industrial area

Anikó Csecserits, Péter Dezsényi, Melinda Halassy, Anna Kövendi-Jakó, Imelda Somodi, Katalin Török

The new LEGO factory built in East-Hungary aims to be the greenest factory in many ways, among others biodiverse green areas are to be established on its outskirts. Based on the estimates of potential natural vegetation models and the requirements of the factory, we have chosen the mosaic of open steppe oak forest (*Festuco rupicolae-Quercetum roboris*) and sandy grasslands (*Pulsatillo hungaricae-Festucetum rupicolae*, *Potentillo arenariae-Festucetum pseudovinae*, *Festuco vaginatae-Corynephorum*) as target. The open steppe oak forest is one of the most endangered habitats in Hungary as its extent is only 290 ha. The area of acidic sand grasslands characteristic to the region has also decreased (only approx. 1020 ha remained). The aim of the LEGO project is to reconstruct 26.5 ha of the oak forest steppe - grassland mosaic that would be a considerable step in the preservation of this vegetation type.

The restoration project started in 2013 in approx. 10 ha in three distinct areas. In the autumn of 2013, nurse crops were sown before the establishment of grasslands. Three different methods were used for grassland restoration: 1) spreading of hay originating from semi-natural grasslands 2) sowing biodiverse commercial seed mixture and 3) sowing of seeds collected from semi-natural grasslands. Forest patches were established in the matrix of grasslands in varying size (300-3000 m²) and shape, using eleven tree and eleven shrub species.

In 2014, baseline data was collected, including coenological, soil and seed bank data. The surrounding of the factory was mapped in order to assess the local propagule pool of native and invasive plant species. We aimed to define reference sites (remnants of open steppe oak forests and target grassland communities) in the region, in order to compare and evaluate the results of the restoration. Here we represent the first year results of the restoration and the description of the reference sites.

Keywords: seed sowing, reference site, potential vegetation, nurse crops, hay transferring

Nutrient composition of native vegetation growing in the pastures of Central Tunisia.

Aziza Gasmi-Boubaker, Rosa Mosquera-Losada, Antonio Rigueiro-Rodríguez, Taha Najjar

A preliminary investigation was carried out to evaluate the nutritive value of vegetation growing naturally in the pastures of Central Tunisia. The study examined 13 species (*Artemisia herba alba* asso., *Chrozophora tinctoria*, *Solanum vigum*, *Globularia alypum* L., *Brassica souliei* (Batt.), *Colestephus myconis* L., *Thymus hirtus* sudsp *algeriensis*, *Marrubium vulgare* L.; *Marrube vulgaire*, *Pinus halepensis*, *Plantago lagopus* L., *Rosmarinus officinalis* L., *Pistacia lentiscus* L. and *Imperata cylindrica*.). Samples of these species were collected in the spring season (march, april and may) and analyzed for dry matter, ash, crude protein (CP), crude fibre (CF), as well as Ca, P, K, Mg, Na, Fe, Cu, Zn and Mn concentrations. Results reveal that the species have properties in terms of contents of protein and some mineral elements that could be advantageously employed to improve the quality of standing hay of pastures. Crude protein content is fairly high in some of the species with a range of between 13.68% in *Plantago lagopus* L. and 24.66% in *Brassica souliei* (Batt.). The latter specie had the lowest CF content (4.69 %) and the highest value (43.47%) was in *Imperata cylindrica*. The species had mean values of $2.62 \pm 1.22\%$ Ca and $0.25 \pm 0.24\%$ P. Levels of Ca was high and more than the standard requirements for small ruminant production. Moreover, the high levels of Ca resulted in unusually wide Ca/P ratios of 15.5 : 1 ± 8.3 : 1 among the species. All of the species had Mg, Zn, Cu and Mn levels that could meet the requirements of small ruminants, but P and Fe were slightly deficient for some of the species.

Keywords: Crude protein; Pasture, Small ruminant, Mineral composition

Planning and management options for the pastoral resource for the region of Mecheria (Naama, Algeria)

Driss Haddouche, Slim Saidi

Pastoral crisis in Algeria has its origins in rangeland degradation which are the main factor in any activity in the steppe zones. Indeed, faced with the increasing human and animal population on a living space smaller and smaller, there is an overuse of what remain of the steppe rangelands.

Knowing the amount of biomass available, the practice of grazing options, taking into account the use of "Use Factor" factor remains an essential method for managing pastoral resources. This factor has three options: at 40% Conservative pasture; at 60 % the beginning of overgrazing; at 80% destructive grazing.

Accessibility on the pasture is based on our field observations of a type any flock along a grazing cycle. The main purpose of these observations is to highlight the speed of herd grazing situation. Several individuals from the herd were timed to arrive at an average duration of about 5 seconds to move between two tufts of grass, separated by a distance of one meter. This gives a rate of 5 s / m (0.72 km / h) flat. This speed varies depending on the angle of the slope.

Knowing the speed and slope of each pixel of the study area, given by the digital elevation model of Spot Image (MNE) and whose pitch is 15 meters, a map of pasture according to the distances is generated.

Knowing the stocking and biomass available, the examination of the common of Mecheria at regular distances (8.64 Km or 12 hours of grazing, 17.28 Km or 24 hours of grazing and 25.92 Km or 36 hours of grazing), offers three different options (conservation grazing resource: utilization at 40%; overgrazing statements for use at 60% and grazing destructive for use by more than 80%) for each distance traveled by sheep from the starting point is the town of Mecheria.

Keywords: Pastoral Crisis; Biomass; animal Charge; Use Factor; Mecheria; Algeria.

Effects of wildfire burning on seed bank diversity, and mycorrhiza symbiosis of perennials grasses in a dry grassland

Mohammad Jankju, Vajihe Khaksarzadeh, Zakieh Ghasemi Mayvan

Wildfire burning is a common problem, in many dry grasslands worldwide. Its effects on the aboveground vegetation characteristics (e.g. biomass, diversity, richness) have frequently been studied. However, little information is available on the effects of wildfire burning on soil seed bank and on plant-mycorrhiza symbiosis. Dash-Arasi dry grassland in Quchan, NE Iran, had been under wildfire burning in summer 2012. We established 10 line-transects, in the burnt or control sites during subsequent growing season (spring-summer 2013). Soil samples (40 replicates) were taken from 5-10 cm soil depth, for studying seedbank diversity and composition. Furthermore, root and soil samples were taken from the root media of dominant plants species. Seedbank species diversity, richness and evenness were higher in the burnt than the control site. However, the higher diversity indices were due to increase of ephemeral (annual grasses and forbs plus geophytes), in the cost of reducing perennials (grasses, forbs and shrubs) in the soil seed bank. Wildfire burning reduced mycorrhizal colonization with the dominant perennial grass *Festuca ovina*, but it increased colonization rate and spore number for the invasive ephemeral grass *Poa bulbosa*. At the time of wildfire burning (July), ephemeral species had finished their phenology whereas perennial species were still in the flowering or vegetative stages. Therefore, a summer time burning should be avoided in the dry grasslands, as it will favor invasive species and harm perennial species, via affecting their seed bank diversity and mycorrhiza symbiosis.

Keywords: seedbank, dry grasslands, soil ecology, fire, richness, Iran

P10

Population biology of *Astragalus monspessulanus* agg. (*Astragalus illyricus*, sect. *incani*, Fabaceae) in the Northern Adriatic

Darja Javornik, **Nina Šajna**, Boštjan Surina

The European taxa of the section *Incani* are represented by only 3 species (*A. incanus* L., *A. monspessulanus* L. and *A. spruneri* Boiss.) and several other taxa ranked on subspecies level or below, distributed mostly in dry grassland habitats in the Mediterranean. While our ongoing broader investigations aim at more accurate taxa circumscriptions, we herewith present the first results about population biology, which are needed for accurate interpretations of our taxonomic study. We focused on populations of *Astragalus monspessulanus* agg. (*Astragalus illyricus*, sect. *Incani*, Fabaceae) in the Northern Adriatic. We were especially interested in a population, which according to our previous results differed from others in morphological and molecular characteristics. We studied reproductive effort by monitoring detailed flowering phenology. We compared patterns in flowering, fruit development and seed production among selected populations. Here we present results of the flowering overlap analysis. Additionally, we compared reproductive success by performing pollinator including/excluding experiments. Expected dominating cleistogamy was not confirmed, neither by pollen:ovule ratio analysis, nor by observations in the field. Our results include a list of observed pollinators. Furthermore, germination studies showed high seed viability, where the seed scarification treatment enhanced the germination rate.

Keywords: *Astragalus illyricus*, phenology, phenological overlap, pollination, germination

P11

Influence of successional age and soil parameters on functional species groups in recovering sandy old-fields

Ágnes-Júlia Albert, András Kelemen, Orsolya Valkó, Balázs Deák, Tamás Migléc, Anikó Csecserits, Tamás Rédei, Béla Tóthmérész, Péter Török

We studied 20 old-fields in the calcareous sand region of Kiskunság (Central-Hungary) classified into four age-categories with five old-fields in each age-category. For the baseline vegetation reference, we sampled 3 open and 3 closed sand grassland stands in the vicinity of the studied old-fields. In each old-field and reference grassland the percentage cover of vascular plants was recorded in five 2×2 m plots twice, in early May and late June 2012. We collected soil samples from each site in early May and the samples were analyzed for pH values, CaCO₃, N, P, K and humus-content. Based on the spontaneous vegetation development of old-fields in a calcareous sand region we aimed to answer the following questions using the chronosequence method: (i) What is the influence of successional age and soil parameters on the cover and species number of functional species groups? (ii) How do soil parameters influence the cover and species number of target species in the differently aged old-fields?

We used life-form categories, lateral spreading traits, average height values and propagule dispersion types in the analysis. Species of *Festuco-Brometea* class were considered as target species. We found that the cover of hemicryptophytes increased with time, while the cover of short-lived species and geophytes gradually decreased over time. The cover of species with big thousand-seed weights increased with time. The forms of nitrogen had a significant effect on the cover of species with different lateral spread traits. The results for the target species were similar to the previous ones in the case of hemicryptophytes and short-lived species. The species number of target chamaephytes was also significantly affected by age. Covers of target hemicryptophytes and short-lived species correlated significantly with soil phosphorous-content. Forms of nitrogen also had a significant effect in the case of target short-lived species. Lateral spread was significantly affected both by soil phosphorous-content and forms of nitrogen in the case of target species cover-based analysis. Species number of the target species characterized by zoochory correlated significantly with soil P and N-contents. Distinguishing which environmental factors influence the vegetation development in disturbed sites is crucial for successful ecosystem restoration. Also plant functional types can be useful tools in predicting colonization success of species and this may be potentially exploited in various restoration programmes.

Keywords: grassland restoration; spontaneous succession; abandonment; calcareous sand

Xeric grasslands (*Festucetalia valesiaca*) diversity in North-Eastern Romania**Constantin Mardari**, Catalin Tanase

Dry grasslands are semi-natural plant communities with a major importance for biodiversity in Europe and, consequently, of great conservation value. At small spatial scales (up to 10 m²) dry grasslands represents the most species rich plant communities in the world. Most of them evolved under the combined effects of environmental conditions and traditional land use. Our study is focused on a numerical classification (hierarchical, using Flexible β algorithm and Bray-Curtis dissimilarity) based on 300 plots (own and from literature), of the dry grasslands (*Festucetalia valesiaca*) from the North-Eastern region of Romania and on the investigation of the effect of some environmental variables on their diversity. Gradients in floristic composition were detected using detrended correspondence analysis while the strength of the effect of each environmental variable (Ellenberg indicator values) was assessed via canonical correspondence analysis and Monte Carlo test. Eleven plant communities were distinguished (communities of *Festuca valesiaca*, *Poa angustifolia*, *Artemisia austriaca*, *Poa bulbosa*, *Dichanthium ischaemum*, *Stipa capillata*, *Festuca rupicola*, *Chrysopogon gryllus*, *Agropyron cristatum* subsp. *pectinatum*, *Calamagrostis epigeios* and *Stipa lessingiana*) with a floristic composition mainly shaped by the soil's nitrogen content. Also, the diversity of these xeric grasslands was investigated and, although these grasslands have lower α and β (expressed as the z values of the power-law function in 45 nested series) diversities compared to other regions of Romania (as Transylvania), in their floristic composition there are numerous rare or threatened species which support the need of their conservation.

Keywords: semi-natural grasslands, *Festucetalia valesiaca*, vegetation classification, vegetation-environment relationship, diversity

P13

Disentangling the forest-steppe ecotone – what drives the differentiation of light birch forests and grasslands in the forest-steppe of Western Siberia?

Wanja Mathar, Immo Kämpf, Kathrin Gottbehüt, Till Kleinebecker, Norbert Hölzel

The forest-steppe ecotone in Western Siberia covers the transitional region between steppe grasslands and (hemi-) boreal forests. Whereas tree growth is restricted to extrazonal moist sites in the dry steppes, the surplus in precipitation allows primary birch forests to establish in the forest-steppe. Dependent on local soil and climatic conditions, but also due to fire and insect outbreaks, the ratio of forests and grasslands varies naturally within a wide range. In addition, the historically extensive grazing by nomad herds have contributed to the open parkland structure of the forest-steppe. Due to the absence of broad-leaved tree species that form a dense shady canopy, the herbaceous vegetation layer of the forests is mainly formed by mesophilous light-demanding species typical for open-habitats. Hence, forest and grasslands in the forest-steppe zone of Western Siberia exhibit a large overlap in their species pool. However, grassland in this region have strongly been altered by land-use such as the transformation into cropland, intense grazing or improvement by seeding of fodder grasses. We studied how factors such as land-use, abiotical site condition and landscape configuration drive the species differentiation of forest and grassland communities in the forest-steppe zone of Western Siberia. Furthermore, we discuss how light birch forest could function as an biodiversity insurance for conservation of grasslands in this region.

Keywords: Forest-steppe, Species pool

P14

Seasonal fluctuation of date palm scale *Parlatoria blanchardi* Targ. (Homoptera, Diaspididae) in Biskra region (Est Algeria)

Mohamed Seghir Mehaoua, Dalale Belkhiri, Mohamed Biche

The date palm scale is one of the most dreaded pests of the Algerian palm groves. This insect develops in the dry hot climates; it attacks both the green part of the tree and fruit. The study results of this pest seasonal fluctuation have shown the presence of two generations per year, a very important spring generation, which begins March 16 to September 7 and an autumnal one which starts from September 14 until January 18, followed by a hibernation during the month of February. Our results also show two main lay eggs periods, a spring and autumnal with respectively a maximum average fertility during the month of April (6.64 eggs per female) and October (5.05 eggs per female), and with an average fertility of 3.2 eggs per female. Mortality recorded in larval stages is highest during the months of April, August and December with respectively 11.64%, 10.54% and 11.62%. While the recorded adult mortality is highest during the months of June, September and January, with respectively 39.80%, 35.32% and 31.92%. The seasonal fluctuation of the date palm scale is strongly influenced by climatic factors. Also, extreme temperatures had a negative effect on the flight of *Parlatoria blanchardi*.

Keywords: *Parlatoria blanchardi*, date palm, seasonal fluctuation, fecundity, mortality

P15

Dryland regions in east of Algeria: Diversity, abundance and biomass of freshwater fish in three reservoirs

Fateh Mimeche, Mohamed Biche

The Algerian ichthyofaunal region is mostly characterized by a low diversity in freshwater fish. This study presents data on fish community structure and distribution in three reservoirs in dryland regions in the east of Algeria. The climate of the regions is subject to the influence of the Sahara and is characterised by wet winters, dry and hot summers and high level of evaporation. A total of 12 species representing three families was recorded in the investigated reservoirs. In this study the Cyprinidae was dominant with 86.71%, eight species was recorded, with two native species *Luciobarbus callensis* distributed in semiarid area and *Luciobarbus biscardensis* in arid area. The rest of the cyprinids were introduced: *Cyprinus carpio carpio*, *Hypophthalmichthys molitrix*, *Hypophthalmichthys nobilis*, *Carassius carassius*, *Carassius auratus gibelio*, *Squalius cephalus*. The Poeciliidae present 10.68% of total abundance (*Gambusia affinis* and *Gambusia holbrooki*). The third family Cichlidae recorded a low abundance 2.61% represented by *Tilapia zillii* (native fish) and *Oreochromis niloticus*. Fish biomass of two reservoirs in the north of our studied area (K'Sob and Ain Zada reservoirs) is high but the south investigated area (the Fountain of gazelles reservoir) presents medium biomass.

Keywords: Freshwater fish diversity, abundance, biomass, dryland regions, Algeria

P16

Study of the germination conditions, water use efficiency and resistance to overgrazing of *Rhanterium epapposum*, an endemic species of a high forage value in Hail region (North of Saudi Arabia)

Khalil Mseddi, Ahmed Alghamdi, Raied Shammari, Naser Ibrahim

Saudi Arabia (KSA) is one of the countries that suffer from the degradation of natural range-lands aggravated by severe drought. Range-lands with wild forage species decreased and refuted in difficult accessible zones such as mountains and deep Wadi.

Hail region (North of KSA) is considered as one of the most important zones for livestock production because it includes a high surface of natural range-lands. However, the high degradation of these area allows to the disappearance of many forage and medicinal plant species, the decrease of quality and quantity of forage production, the facilitation of invasion by aggressive non-native species and the alteration of landscape ecosystems. Urbanization, over-grazing accentuated by severe climatic conditions are considered as the major threat to biodiversity and natural range-lands and responsible for of the disturbance of *Rhanterium epapposum*, endemic species of a high nutritive value for livestock herbivores.

Germination difficulties, water stress and overgrazing allow to divide this research in three parts. The first part was reserved to the study of the optimal conditions of seed germination (temperature, water potential and light) for this threatened species. In the second part, the water use efficiency was established, whereas the last part of this work was reserved for the study of the resistance to over-grazing by a system of successive cuts.

Results of this study can be used for innovative program developed for the restoration of degraded rangelands by the use *Rhanterium epapposum*, endemic and a high quality forage species.

Keywords: Germination, water use efficiency, overgrazing, *Rhanterium epapposum*, Hail

P17

The effects of fragment size and isolation on ground-dwelling arthropod assemblages in dry sandy grassland fragments

Dávid D. Nagy, Tibor Magura, Roland Horváth, Csaba Szinetár, János Eichardt, Viktor Ködöböcz, Béla Tóthmérész

Habitat fragmentation and isolation are major threats to biodiversity in natural and semi-natural habitats. Habitat reduction and isolation negatively influence the diversity of habitat specialist plant and animal species. Moreover, from the heavily fragmented and isolated patches these species may disappear. Due to the increase of intensity of agricultural activities and abandonment of the traditional management practices grasslands are one of the most threatened habitat types. Rules of island biogeography suggest that the species richness increases with the size and decreases with the isolation of habitat fragments. We tested these rules on ground-dwelling arthropods in sandy grassland fragments. Ground beetles and spiders were sampled in eight differently sized and isolated dry sandy grassland fragments in the Nyírség region of the Great Hungarian Plain (Eastern Hungary). Contrary to the classical island biogeography theory, we found a significant negative relationship between the total number of ground beetle and spider species and the grassland size. However, the ratio of grassland specialist ground beetle and spider species increased with fragment size. The total number of ground beetle species increased as the isolation of fragments increased, while there was no significant relationship between the total number of spider species and the isolation of fragments. The ratio of grassland specialist spider species decreased with the increasing of isolation, while there was no statistically significant relationship between the isolation and the ratio of grassland specialist ground beetles. Based on our results, to conserve the grassland specialist arthropod species, the large and least isolated grassland fragments should be preserved and the adjacent croplands of the heavily fragmented and isolated grassland patches should be restored.

Keywords: fragmentation, grassland specialist, ground beetle, island biogeography, spider

P18

Comparing plant functional types in the old-field and a natural rangeland vegetation

Fariba Noedoost, Mohammad Jankju, Maryam Nikan

This research was conducted to compare plant functional types (PFT) and traits in an old-field (abandoned for 28 years) and a control site, in the Baharkish rangelands, Quchan, Iran. In the both sites, 40 randomized quadrates were established. Floristic list, frequency, canopy cover and 20 vegetative, phenological and morphological plant traits were measured for all plant species, within each quadrate. According to the Pearson correlation analysis, and by using R software, 9 plant traits including life form, plant canopy, reproduction mode, reserve organ, root type, leaf phenology, growth form, life cycle, and regeneration mode, were known as the major plant functional traits. Data classification and ordination were applied on a matrix of 9 traits ×112 species, by using CANOCO and TWINSpan softwares. It led to identification of 5 plant functional types. Total canopy cover of two PFT was significantly (70%) reduced and that of three PFT's were relatively (10-20%) increased in the abandoned field. In conclusions, plants being annual, therophyte, geophytes, and rhizomatus are tolerant, whereas those being perennial (phanerophyte, chemaphyte, hemicryptophyte), having tap root system, and wide canopy cover are known as sensitive to ploughing disturbance.

Keywords: Baharkish, grassland, old-field, plant functional trait, physical disturbance

Behavior and Breeding phenology of the Ruddy Shelduck *Tadorna ferruginea* in Ziban dry grasslands (Algerian steppe)

Yacine Noudjem, Ettayib Bensaci, Menouar Saheb, Moussa Houhamdi

During this study conducted in the wetlands of the Ziban region (South-eastern of Algeria) from August 2008 to July 2011, the Ruddy Shelduck *Tadorna ferruginea* was presented the resident breeder status. The maximum recorded was 285 individuals observed during the second half of October while the lowest numbers were recorded during the months of June, July and August of each year. The analysis of the diurnal time budget shows that the feeding is the main activity. She has almost 50% of the total day budget. It is followed by the activities of movement (swimming: 9.28%, walking: 2.62% and the flight: (1.75%), sleeping (16.91%), preening (7.85%), courtship (4.38%), antagonism (4.03%) and resting (3.88%). This shows that this wetlands act as delivery day. These sabkhas and chotts are also breeding grounds for this species. Whereas, between 101 and 148 nests have been estimated through all wetlands of the area.

Keywords: Ruddy Shelduck, *Tadorna ferruginea*, Algeria, Ziban, dry grasslands, breeding, Time budget.

P20

The Dynamics of Growth and Development of Stipa Species During Restoration of Steppe Vegetation (European Russia)

Elena Volkova, Olga Burova

The *Stipa* species are main component of steppe communities. The study of biology of these species is necessary for restoration of vegetation. The restoration at the area of Kulikovo Field begins from sowing *Stipa* seeds to arable lands. The concentration of seeds is: *Stipa pennata*, *S. pulcherrhima* - 45-50 kg/ha, *S. stenophylla* – 15 kg/ha. The germination of seeds is less than 30%. After germination, the density of seedlings varies from 216 (*S. pulcherrhima*) till 651 (*S. pennata*) thousands units per ha. By the end of the 1st year the 30-50% of young plants died. The morphological differences between *Stipa* species are insignificant. Later the proportion of surviving plants continues to decline: by the end of 2nd year 34-50% of plants saved, and by the 5th year is 15-25% only. The growth of turfs is increasing: height goes up from 25 till 70 cm, diameter - from 0.5 to 15 cm, the abundance goes up to 55-65%, number of vegetative (up to 75-100 units) and generative (up 25-55 units) shoots, the size of leaves. In artificial conditions the *Stipa* plants go to generative stage quickly and become capable of fruiting at the 2nd year. The increasing of age of *Stipa* plants is accompanied by increasing the size of the inflorescence (up to 25 cm) and number of grains per plant (up to 10-15 units). In general, seed production of 5-years plants: *S. pulcherrhima* - 296, *S. pennata* - 460, *S. stenophylla* - 780 grains/plant. The increasing of morphological parameters occurs till 5 years of age. The 10-year-old plants are characterized by decreasing of growth intensity and seed productivity. It means that after 5 years the process of "aging" of plants starts, which is indicated by the reduction of biological parameters and the death of the central part of the turf.

Keywords: steppe vegetation, restoration, *Stipa*

P21

Model of potential distribution of *Ch. stipae stipae* Hille Ris Lambers, 1939 (Insecta, Hemiptera, Aphididae).

Karina Wieczorek, Agnieszka Bugaj-Nawrocka, Mariusz Kanturski

Steppes are located within the temperate zone, in the depths of the continents, where the inflow of moist sea air is small. The Eurasian Steppe, also called the Great Steppe, is the world's largest steppe ecoregion, characterized by grassland plains without trees. The dominant element of steppe vegetation are representatives of the genus *Stipa* L. Many species of this genus are subjected to species protection, particularly in Europe. Some of the insects feeding on those needlegrass are aphids of the genus *Chaetosiphella*, in particular *Ch. stipae* subsp. *stipae* Hille Ris Lambers, 1939. To learn about some ecological aspects of *Ch. stipae* and its steppe habitat, an ecological niche modeling was introduced. We used unique occurrence localities for the *Ch. stipae* and the species of the genus *Stipa* to modeling the potential distribution of mentioned aphid and its habitat. To estimate the influence of global climate change on the potential distribution of *Stipa* species, the distribution of the species for three different time slices (present, 2050 and 2070) and for four representative concentration pathways (RCPs) were modeled.

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Keywords: aphid, ecological niche modelling, habitat suitability, *Stipa*

Morphological variability of the xerothermophilous aphid species *Ch. stipae stipae* Hille Ris Lambers, 1939 (Insecta, Hemiptera, Aphididae)

Karina Wieczorek, Agnieszka Bugaj-Nawrocka, Mariusz Kanturski

Ch. stipae stipae Hille Ris Lambers, 1939 is a xerothermophilous aphid species connected with temperate steppe zones or dry mountain valleys of the Palaearctic. This species is characterized by the variability of the number and the shape of setae. We analyzed 16 morphometric variables and 7 morphometric ratios of 64 individuals of *Ch. stipae stipae* from the local populations distributed in Spain, Switzerland, Austria, Czech Republic, Poland, Hungary, Turkey, Kazakhstan and Mongolia. Morphometric variables were analyzed with the use of STATISTICA software using the discriminant analysis module, applying stepwise discriminant function analysis (DFA), followed by canonical analysis (CA), as well as principal components analysis (PCA). The methods used showed that all individuals studied are one species, characterized by high morphological variability. However, the closest are Spanish and Kazakh population which share a common characters different than in other populations studied: longer antennae, shorter apical segment of the rostrum, longer jagged marginal seta on the first abdominal segment, longer setae of hind tibia and the lowest ratio of the apical segment of the rostrum to the third antennal segment. Both populations share a common type of climate - cold semi-arid climate, also called steppe climate.

This research was supported by the National Science Centre, Poland, grant no 2011/01/B/NZ8/00157

Keywords: chaetotaxy, distribution, *Stipa*, steppe

Effects of grazing exclusion on above- vs. below-ground biomass allocation in three zonal alpine grassland types on the Northern Tibetan Plateau

Chaoxu Zeng, **Jianshuang Wu**, Xianzhou Zhang, Zhenxi Shen, Susanne Wurst

Biomass allocation is an essential concept for understanding above- vs. below-ground functions and for predicting the dynamics of community structure and ecosystem service under ongoing climate change. There is rare available knowledge of grazing effects on biomass allocation in multiple zonal alpine grassland types along climatic gradients across the Northern Tibetan Plateau. We analyzed the peak above- and below-ground biomass (AGB and BGB) values at 106 pairs of well-matched grazed vs. fenced sites collected during summers of 2010-2013, of which 33 pairs were subject to meadow, 52 to steppe and 21 to desert-steppe. The peak AGB represented the aboveground net primary productivity (ANPP) while the belowground net primary productivity (BNPP) were estimated from AGB, the ratio of living vs. dead BGB, and the turnover rate of roots. Two-way analyses of variance (ANOVA) and paired samples comparisons with t-test were applied to examine the effects of pasture management system (PMS, i.e., grazed vs. fenced) and zonal grassland types affect both ANPP and BNPP. Allometric and isometric allocation hypotheses were also tested between logarithmically transformed ANPP and BNPP using standardized major axis (SMA) analyses across grazed, fenced and overall sites. In our study, a high community-dependency was observed for biomass allocation in association with decreased ANPP and increased BNPP proportions with increasing aridity across the Northern Tibetan Plateau. Grazing vs. fencing seemed to have a trivial effect on ANPP compared to the overwhelming influence of different zonal grassland types. Vegetation links above- and below-ground ecological functions through integrated meta-population adaptive strategies to the increasing severity of habitat conditions. Therefore, more detailed studies on functional diversity are essentially to achieve conservation and sustainability goals under ongoing climatic warming and intensifying human influences.

Keywords: allometric growth; alpine grasslands; biomass partitioning; isometric allocation; grazing exclusion; Northern Tibetan Plateau

Excursion Guide

Botanic Garden excursion at May, 25th (morning)

Excursion guides: Ute Becker, Ralf Omlor, Christian Uhink (always in alphabetic order)

During the guided tour through the Botanic Garden the replica of the Mainz Sand area and several xerothermic vegetation complexes will be visited including a replica of the south Russian steppe (which was created with seed material collected during the EDGG expeditions to Ukraine 2010 and Siberia 2013).

Mainz Sand area excursion at May, 25th (afternoon)

Excursion guides: Thomas Becker, Ute Becker, Hans-Jürgen Dechent, Volker Hohenberg, Corinna Lehr, Alfred Westenberger

The Mainz Sand area at the edge of the city of Mainz is part of a larger aeolian calcareous sand area reaching from Mainz to Ingelheim about 15 kilometres west. It was formed in the Pleistocene, when sand had been blown out from the Rhine River valley and accumulated. Today, most parts of the sand area are under intensive land use for the production of wine, fruits (mainly stone fruits) and even asparagus. A part of the protected area was already established in 1939 as the Mainz Sand reserve. In the 1970s, at the margin of the area, a number of high-rise buildings were built and in addition, the highway to Wiesbaden was constructed. It is surprising that the area is still full of endangered species, both plants and animals but a number of species had already extinct in the area. The Mainz Sand area (which was extensively studied by D. Korneck: KORNECK 1974) contains the westernmost dry continental sandy grasslands belonging to the *Koelerion glaucae* (Ass. *Jurineo-Koelerietum glaucae*), and large stands of the *Festucion valesiaca* (*Allio-Stipetum capillatae*) on sandy soil. In a natural pine forest, semi-dry grasslands of the *Cirsio-Brachypodion* (*Adonido-Brachypodietum pinnati*) type have developed, and on disturbed open sites there is annual vegetation of the *Sileno conicae-Cerastion semidecandri* (*Bromo tectorum-Phleetum arenaria*, and *Sileno conicae-Cerastietum semidecandri*). This area is the only location of *Onosma arenaria* in Germany and is an example of relict vegetation that has survived in this isolated area since the late Pleistocene. Other relict or rare xerothermic species in the area are *Adonis vernalis*, *Alyssum montanum* subsp. *gmelinii*, *Anthericum liliago*, *Bassia lanifolia* (= *Kochia arenaria*), *Carex ericetorum*, *Carex humilis*, *Carex supina*, *Euphorbia seguieriana*, *Festuca duvalii*, *Fumana procumbens*, *Gypsophila fastigiata*, *Medicago minima*, *Odontites luteus*, *Orobanche alba*, *Orobanche arenaria*, *Peucedanum oreoselinum*, *Poa badensis*, *Potentilla incana*, *Scabiosa canescens*, *Scorzonera purpurea*, *Seseli annuum*, *Silene conica*, *Silene otitis*, *Stipa pennata*, *Trinia glaucae*, *Veronica prostrata* subsp. *scheereri* (= *Veronica satureiifolia*), and *Viola rupestris*.

During our excursion through the area, we will focus on plants, animals (mainly insects) and on vegetation. Furthermore, we will discuss the challenges and opportunities for conservation. Syntaxonomic scheme of the Mainz Sand dry grasslands is the following:

Class *Koelerio-Corynephoretea* Klika in Klika & V. Novák 1941

Order *Festuco-Sedetalia acris* Tx. 1951

All. *Sileno conicae-Cerastion semidecandri* Korneck 1974

Ass. *Bromo tectorum-Phleetum arenarii* Korneck 1974

Ass. *Sileno conicae-Cerastietum semidecandri* Korneck 1974

All. *Koelerion glaucae* Volk 1931

Ass. *Jurineo-Koelerietum glaucae* Volk 1931

Class *Festuco-Brometea* Br.-Bl. & Tx. ex Klika & Hadač 1944

Order *Festucetalia valesiaca* Br.-Bl. et Tx. ex Br.-Bl. 1950

All. *Festucion valesiaca* Klika 1931

Ass. *Allio sphaerocephali-Stipetum capillatae* (Knapp 1944) Korneck 1974

Order *Brachypodietalia pinnati* Korneck 1974

All. *Cirsio-Brachypodion pinnati* Hadač & Klika 1944

Ass. *Adonido-Brachypodietum pinnati* (Libbert 1933) Krausch 1961

Class *Trifolio-Geranietea sanguinei* Th. Müller 1962

Order *Origanetalia vulgaris* Th. Müller 1962

All. *Geranion sanguinei* Tx. in Th. Müller 1962

Ass. *Thalictro mini-Geranietum sanguinei* Korneck 1974

Class *Pyrolo-Pinetea sylvestris* Oberd. et al. 1967

Order *Pulsatillo-Pinetalia sylvestris* Oberd. et al. 1967

All. *Cytiso-Pinion sylvestris* Krausch 1962

Ass. *Pyrolo-Pinetum sylvestris* (Schmid 1936) Meusel 1952

Post-conference trip 1 at May, 26th 2015 – Dry grasslands and dry heathlands on volcanic soils in the Rhine-Hessian Swizz

Excursion guides: Thomas Becker, Ute Becker, Hans-Jürgen Dechent, Corinna Lehr

The Rhine Hessian Swizz is located in SW Germany, Rhineland-Palatinate, between Bad Kreuznach and Alzey in the north-western most upper Rhine Rift or the transition zone of the Mainz Basin and the North-Palatinate Mountains between 235 and 385 m a. s. l. The topography of the area can be described as a hilly plain with embedded hills and low mountains. Dry grasslands occur at the hill tops and steeper slopes while plains and gentle slopes were mostly covered by vineyards. Hills and low mountains were formed by volcanic rock from the lower Perm period (Lower Rotliegendes) and plains by marine clay and silt sediments from the Tertiary (Oligocene) partly covered by Pleistocene loess layers or even marine clay/silt layers. Most hills and low mountains with dry grasslands were formed by

magmatic rhyolite (formerly named Quarzporphyr), a base-poor and nearly lime-free granitic rock which is weathering to shallow soils with acid reaction. The macroclimate of the area is pronounced summer-warm and dry. Mean annual temperature is about 10.5 °C, and mean annual precipitation about 500 mm.

In the area, dry grasslands result of sheep/goat grazing over centuries i.e. most grasslands are anthropogenic. However, occurrences of typical xerothermic relict species such as *Carex humilis*, *C. supina*, *Fumana procumbens*, *Oxytropis pilosa*, *Seseli hippomarathrum*, *Stipa capillata*, *S. pennata* and *S. pulcherrima* indicate that dry grassland plants may have survived in the area as remnants of Pleistocene steppes since the late Pleistocene. Today, most sites of dry grasslands are protected by the German nature conservation law or the European habitat directive (Natura 2000 sites).

On the excursion to Rhine Hesse, we visit the following sites (in chronologic order; for acronyms of associations see below)

Martinsberg SO Siefersheim (German grid 345284/561882; ass. KC1, FB1, FB2, CU)

Mühlberg SW Neu-Bamberg (345846/561780; ass. CU)

Horn W Neu-Bamberg (345301/561920; ass. KC1, FB1, FB2, CU)

Höll S Siefersheim (345197/561876; ass. KC1, FB1, FB2, CU)

KC1 = *Gageo saxatilis*-*Veronicetum dillenii*, KC2 = *Cerastietum pumili*, FB1: *Allio-Stipetum capillatae*, FB2: *Genistello-Phleetum phleoidis*, CU: *Calluno-Genistetum pilosae*

The most typical vegetation type in the region are xerophilic siliceous grasslands with a peculiar species combination that led to the description of the alliance *Koelerio-Phleion* and the order *Koelerio-Phleetalia* by Korneck in 1974 (KORNECK 1974). Meanwhile, the *Koelerio-Phleion* has been reported from many different places in central Europe. In general, dry grasslands in Rhine-Hesse are of high conservation value due to both their special species composition and well preservation indicated by many rare and endangered species (for local vegetation descriptions see KORNECK 1956, BLAUFUß 1974, HECKER 1981, MOEBUS 1985, and OESAU 2011).

The following syntaxonomic scheme shows the most common dry grassland types and their position within the phytosociological system.

Class *Koelerio-Corynephoretea* Klika in Klika & V. Novák 1941

Order *Sedo-Scleranthetalia* Br.-Bl. 1955

All. *Sedo albi-Veronicion dillenii* (Oderd. 1957) Korneck 1974

Ass. *Gageo saxatilis-Veronicetum dillenii* (Oderd. 1957) Korneck 1974

All. *Alyso alyssoidis-Sedion albi* Oderd. et Th. Müller in Th. Müller 1961

Ass. *Cerastietum pumili* Oderd. et Th. Müller in Th. Müller 1961

Class *Festuco-Brometea* Br.-Bl. & Tx. ex Klika & Hadač 1944

Order *Festucetalia valesiacae* Br.-Bl. et Tx. 1943

All. *Festucion valesiacae* Klika 1931

Ass. *Allio sphaerocephali-Stipetum capillatae* (Knapp 1944) Korneck 1974
Order *Brometalia erecti* Br.-Bl. 1936
All. *Koelerio-Phleion* Korneck 1974
Ass. *Genistello-Phleetum phleoidis* Korneck 1974
Class *Calluno-Ulicetea* Br.-Bl. & Tx. ex Klika & Hadač 1944
Order *Vaccinio-Genistetalia* Schubert ex Passarge 1964
All. *Genistion pilosae* Böcher 1943
Ass. *Calluno-Genistetum pilosae* Br.-Bl. 1915

Several in Germany red-listed vascular plant species in the area are: *Allium sphaerocephalon*, *Carex supina*, *Dactylorhiza sambucina*, *Festuca duvalii*, *Festuca valesiaca*, *Fumana procumbens*, *Gagea bohemica* subsp. *saxatilis*, *Globularia punctata*, *Medicago minima*, *Odontites luteus*, *Orchis morio*, *Orobanche arenaria*, *Orobanche caryophyllacea*, *Orobanche purpurea*, *Oxytropis pilosa*, *Pseudolysimachion spicatum*, *Pulsatilla vulgaris*, *Scabiosa canescens*, *Seseli hippomarathrum*, *Silene otitis*, *Spergula pentandra*, *Stipa capillata*, *Stipa pennata*, *Stipa pulcherrima*, *Thesium linophyllum*, *Veronica dillenii*, *Veronica prostrata* subsp. *scheereri* (= *Veronica satureiifolia*); mosses and lichens: *Cladonia foliacea*, *Cladonia rangiformis*, *Peltigera canina*, *Rhytidium rugosum*.

Post-conference trip 2 – Xerothermic vegetation complexes in the Middle Rhine Valley (27.05.2015)

Excursion guides: Thomas Becker, Ute Becker, Christian Uthink

Finally, an excursion will go to the Middle Rhine Valley, to the north-west of Mainz. This area harbours rocky slopes with extensive xerothermic vegetation complexes containing rocky grasslands (*Koelerio-Phleion*, *Festucion pallentis*, *Sedo-Veronicion dillenii*) and xerophilic *Acer monspessulanum* forests (*Quercion pubescentis-petraeae*). It is designated a World Heritage Site by UNESCO and is one of the classic touristic attractions of Germany. Moreover, this valley is a culturally important place for German ancient history. It was here that the Nibelungen Saga took place, in which a German king became invincible by bathing in the blood of a dragon, and finally the gold of the kingdom was sunk in the Rhine River and became the legendary Rhine Gold Treasure. Another saga tells that a fair-haired mermaid named Loreley sat on the rocks and tempted the sailors, distracting them from the dangerous currents, so that they finally sank with their ships in the river.

Our excursion will start at the Loreley (this name is used for both the rock where the mermaid is sitting and for the mermaid herself). From the Loreley we will go to the Spitznack rock where especially well developed *Acer monspessulanum* forests as well as rock grassland of the *Festucion pallentis* (with *Festuca pallens*, *Biscutella laevigata*, *Silene armeria* = *Atocion armeria*, *Cotoneaster integerrimus*, *Amelanchier ovalis*) can be seen. We also will see dry

grasslands of the *Koelerio-Phleion* which, however, are developed in the Middle Rhine Valley only at small sites. The following syntaxonomic scheme shows important communities of the xerothermic vegetation complexes in the Middle Rhine Valley.

Class *Koelerio-Corynephoretea* Klika in Klika & V. Novák 1941

Order *Sedo-Scleranthetalia* Br.-Bl. 1955

All. *Festucion pallentis* Klika 1931

Ass. *Artemisio-Melicetum ciliatae* Korneck 1974

All. *Sedo albi-Veronicion dillenii* (Oderd. 1957) Korneck 1974

Ass. *Gageo saxatilis-Veronicetum dillenii* (Oderd. 1957) Korneck 1974

Class *Festuco-Brometea* Br.-Bl. & Tx. ex Klika & Hadač 1944

Order *Brometalia erecti* Br.-Bl. 1936

All. *Koelerio-Phleion phleoidis* Korneck 1974

Ass. *Genistello-Phleetum phleoidis* Korneck 1974

Class *Quercu-Fagetea* Br.-Bl. et Vlieg. 1937

Order *Quercetalia pubescentis-petraeae* Br.-Bl. 1931

All. *Quercion pubescentis-petraeae* Br.-Bl. 1931

Ass. *Acer monspessulani-Quercetum petraeae* Oderd. 1957

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Botanic Garden map



JOHANNES GUTENBERG
UNIVERSITÄT MAINZ



Botanischer Garten



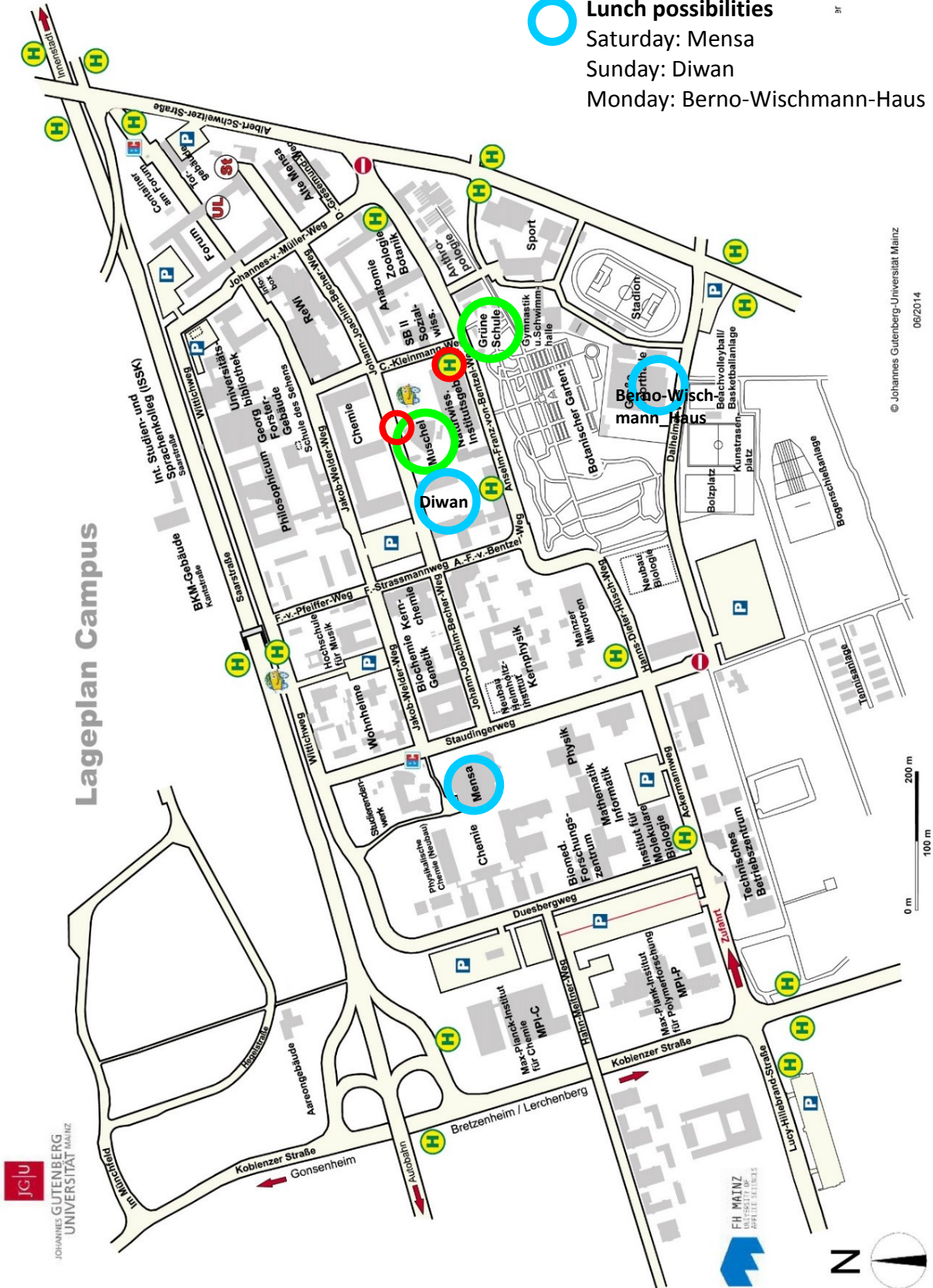
Bauerngarten



GRÜNE SCHULE

Campus map

- **On site registration**
Friday: Botanic Garden at „Grüne Schule“
Saturday and Sunday: „Muschel“
- **Talks: Muschel**
- **Departure Bus for excursions**
Monday: Bus stop „Colonel Kleinmann Weg“
Tuesday and Wednesday: „Muschel“
- **Lunch possibilities**
Saturday: Mensa
Sunday: Diwan
Monday: Berno-Wischmann-Haus



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