



Introduction

During the last three months our organization has developed dynamically. We have invited Michael Vrahnakis to cooperate in the EDGG Executive Committee. The fourth EDGG sub-group has been established focussing on dry grassland biodiversity in Southern and Eastern Europe. The number of members is gradually increasing and the number of involved countries has reached 42. The preparation of the 7th European Dry Grassland Meeting is reaching completion and many of us will meet in May in Smolenice (Slovakia). In July, there will be an international EDGG research expedition in Central Podolia, Ukraine, which you can join. We invite you to read the details of our spring news included in this Bulletin issue. Additionally, you will find here three longer contributions: i) the results of floristic investigations on kurgans in the southern Ukraine, ii) a brief introduction to Mediterranean type ecosystems and iii) a survey of Greek grassland habitats. We wish you pleasant reading and a beautiful and successful growing season for 2010.

Monika Janišová & members of EDGG Executive Committee

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Photo left: Muscari neglectum (to contribution of I. Moysiienko & B. Sudnik-Wójcikowska: Kurgans of Ukraine ...).

March 2010

EDGG homepage: <http://www.edgg.org>

European Dry Grassland Group

The European Dry Grassland Group (EDGG) is a network of dry grassland researchers and conservationists in Europe. EDGG is a Working Group of the International Association for Vegetation Science (IAVS). EDGG is supported by the Floristisch-soziologische Arbeitsgemeinschaft.

The basic aims of the EDGG are:

To compile and to distribute information on research and conservation in dry grasslands beyond national borders;

to stimulate active cooperation among dry grassland scientists (exchanging data, common data standards, joint projects).

To achieve its aims, EDGG provides seven facilities for the information exchange among dry grassland researchers and conservationists:

the Bulletin of the EDGG (published quarterly);

the EDGG homepage (www.edgg.org);

e-mails via our **mailing list** on urgent issues;

the European Dry Grassland Meetings, organized annually in different places throughout Europe.

EDGG research expeditions to sample baseline data of underrepresented regions of Europe

EDGG vegetation databases

Special Features on dry grassland-related topics in various peer-reviewed journals

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

Responsibilities of Executive Committee members:

Jürgen Dengler dengler@botanik.uni-hamburg.de: membership administration, book review editor, contacts to other organisations.

Monika Jani-ová monika.janisova@savba.sk: editorship of the EDGG Bulletin.

Solvita Rasi rusina@lu.lv: editorship of the EDGG homepage.

Michael Vrahnakis mvrahnak@teilar.gr: co-editorship of the EDGG homepage, Med-DG subgroup

Everybody can join EDGG without any fee or other obligation. To become a member of the European dry grassland Group or its subordinate units write an e-mail to Jürgen Dengler including your complete address and specifying which of the groups you want to join. The detailed information you can find at: http://www.edgg.org/about_us.htm.

Mike Vrahnakis, a new member of the EDGG Executive Committee



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grassland ecology and management, phytodiversity, monitoring

South-East European Dry Grassland Group (SEEDGG)

Announcement of a new EDGG subgroup formation and open call for new members



*Directive 92/43 species *Echium russicum* in Lozenska Mt. close to the city of Sofia. Photo: I. Apostolova.*

A workshop on the establishment of a South-East European subgroup of EDGG took place between 27 February and 1 March 2010 in conjunction with 9th international Meeting on Vegetation Databases at the University of Hamburg. The meeting was organized and chaired by Jürgen Dengler and included participants from Bulgaria, Romania, Russia, Germany, Iran and Turkey. The participants of the workshop in Hamburg agreed that creating a database on dry grasslands for the region is an opportunity for setting common data standards, enhancing the studies, sharing knowledge and raising awareness on grasslands in South-Eastern Europe.

SE Europe preserves a remarkable diversity of dry grasslands. Different biogeographic influences (Continental, Steppic, Pontic and Alpine) predetermine this diversity. Certain historical factors mean

there are areas still preserved from current industrial and agricultural development. As an example, the dry steppic grasslands cover between 35 and 40% of the total mapped territories within the national grassland inventories for both Bulgaria and Romania (Veen & Metzger 2009). Since the end of the 19th century the traditionally managed meadows and pastures in Western and Central Europe have changed into intensively exploited grasslands resulting in biodiversity loss. Conservation of High Nature Value grasslands is a consequence of traditional, non-intensive management that is to a larger extent applied in SE European countries. Nevertheless, recent trends in agriculture toward structural changes and intensification pose an increasing threat to these semi-natural grasslands, as well as on the other hand land use abandonment leading to shrub recovery (see for details Küster & Keenleyside 2009).



Verbascum tzar-borisii (Dav. ex Stoj.) Stef.-Gat., a local endemic of dry calcareous grasslands in North-Eastern Bulgaria. Photo: I. Apostolova.

The efforts and further activities of conservation and sustainable management of the dry grasslands should be based on knowledge and understanding their ecology, development and traditional use. There is a lot of information already gathered. However, this data was to some extent collected using different approaches. For example, in some countries (e.g. Bulgaria, Ukraine, Russia) phytosociological studies in the past century were carried out following the dominance approach. Despite the high quality of the data collected, it is hard to compare and combine this data with relevés sampled using Braun-Blanquet approach. Recently, much effort has been made to overcome this problem and many new relevés are collected using standardized approaches.

The new EDGG subgroup wants to contribute to supranational studies on the vegetation and flora of dry grasslands. Numerous endemics and species of high conservation value appear only in these communities, as for example *Centaurea jankae* Brandza distributed only in Bulgaria and Romania and *Centaurea trinerchia* Stevan ex Willd. distributed in Romania, Moldova, Ukraine and Bulgaria (Petrova, 2007). One question to answer would be for instance why dry grasslands host more endemics than mesophytic communities. Other features supranational studies could reveal are e. g. the diversity and origin of these ecosystems. Therefore, a comprehensive database cover-

ing the geographic range of the subgroup is needed and relevés should be collected in insufficiently studied areas.

The main aims of the SEEDGG are (i) the establishment of a comprehensive database for dry grasslands; (ii) using the database for analyses of diversity patterns, large-scale consistent classifications and for conservation planning; (iii) building a platform for research activities for conservation of dry grasslands in SE Europe. The establishment of the joint database, the standardisation of header data and species lists, the compilation of existing data, and the regulation of data usage is coordinated by Steering Committee of presently eight persons, supported by one or two representatives for each of the countries covered.

We agreed to use Turboveg (Hennekens & Schaminee 2001) for the database. The header data will be unified for all countries and common species list for vascular plants, bryophytes, liverworts and lichens will be elaborated considering the most recent taxonomic solutions. The geographic range of the subgroup includes Hungary, Slovakia, Poland (southern part), Serbia, Macedonia, Bulgaria, Romania, Moldova, Ukraine, Russia (European part), Kazakhstan (European part), Azerbaijan, Georgia, and Armenia. This range is rather large but our aims are to cover not only the biogeographic diversity but also the close historical connections of the vegetation concerned. Currently the new subgroup includes about 118 members. EDGG members of South-East European countries are automatically assigned to the subgroup, but we invite and welcome all interested members of EDGG to join us and to participate in our activities.

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EDGG Membership

The number of EDGG members has continued its rapid increase during the last months (Fig. 1). As of 18 March 2010 have 482 members from 42 countries (Fig. 2). The highest density of EDGG members in relation to the human population can be found in Estonia, Slovenia and the Slovak Republic, followed by Greece, Luxembourg, and Germany.

The membership figures of our four regional sub-groups are as follows:

- German Arbeitsgruppe Trockenrasen: 180
- Working Group on Dry Grasslands in the Nordic and Baltic Region: 67
- Mediterranean Dry Grasslands: 87
- Southeast European Dry Grasslands: 120

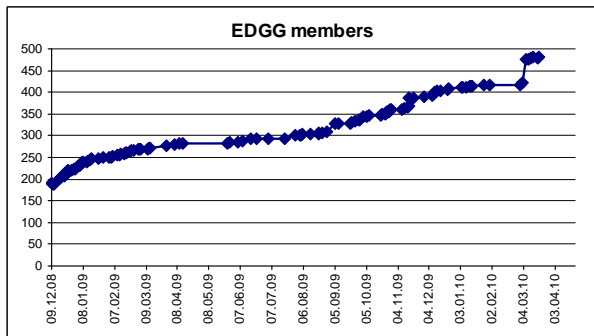


Fig. 1 Development of EDGG membership

Jürgen Dengler (dengler@botanik.uni-hamburg.de)

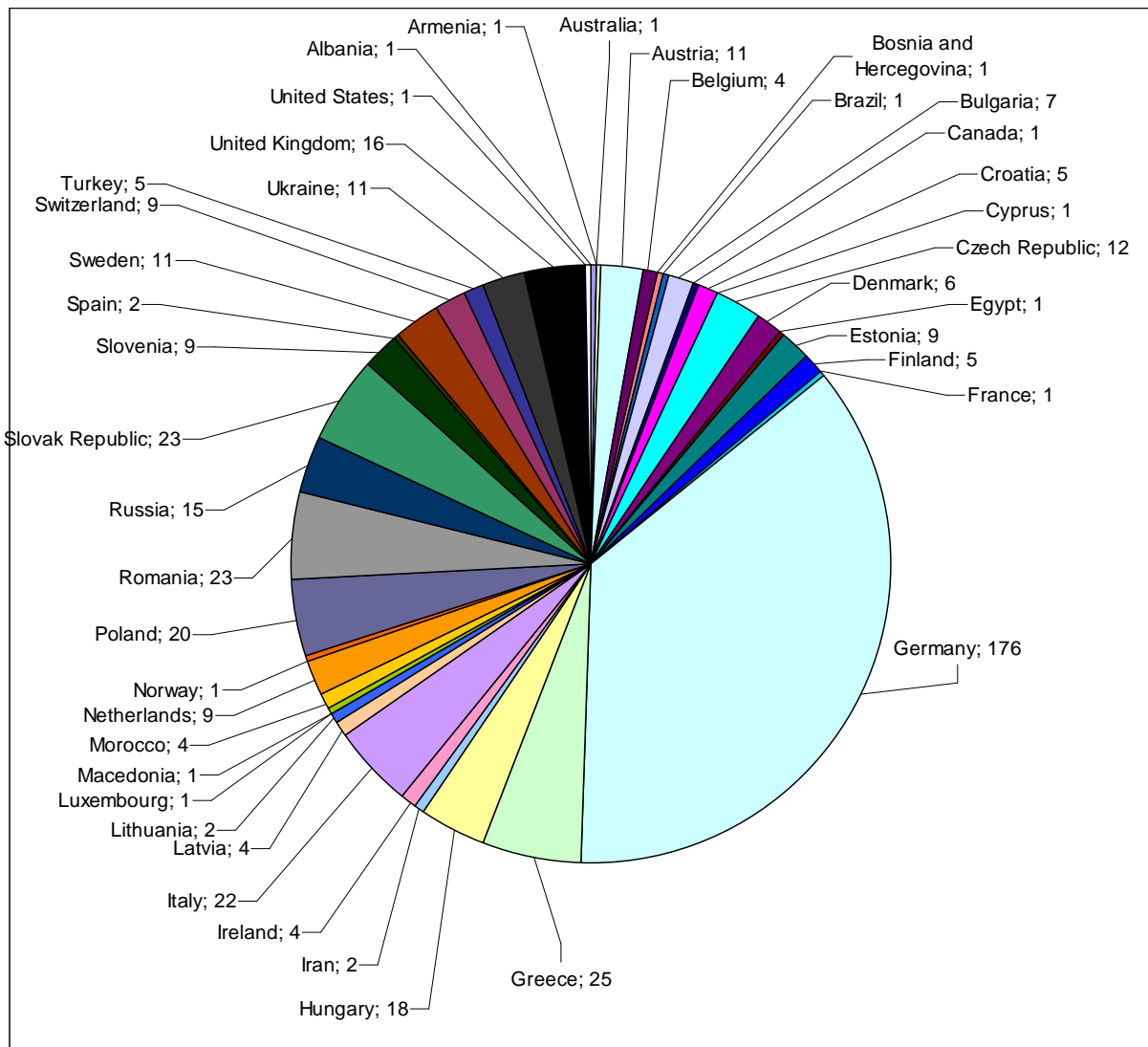


Fig. 2 Countries represented in the EDGG.

EDGG research expedition in Ukraine

July 2010

General information and application

The Southeast European Dry Grassland Group (SEEDGG) within EDGG plans an **international research expedition to Central Podilia from 10⁶25 July 2010**. This event is mainly organised by Anna Kuzemko (National Dendrological Park Sofievka' NAS of Ukraine) and Jürgen Dengler (University of Hamburg, Germany).

Apart from the two organisers and a bus driver, there are 15 places for EDGG members to join this expedition. We would like to assign approximately half of these places to members from Ukraine and half of them to members from other countries. Please send your applications as soon as possible, but **not later than 15 April 2010**, to the two organisers:

applicants from Ukraine, Russia and Belarus:

Anna Kuzemko: anya_meadow@mail.ru

applicants from all other countries: Jürgen Dengler: dengler@botanik.uni-hamburg.de

Should there be more interested colleagues than available places, we will give prevalence to persons who actively collaborate in establishing the supranational vegetation database of SEEDGG, who contribute specific knowledge to our field and subsequent analytical work (e.g. good knowledge in bryophytes, lichens, or critical vascular plants, experience in handling large Turboveg databases, in high-quality field sampling or advanced analytical methods of biodiversity patterns or large-scale classification), or who broaden the geographic diversity among the participants.

Information about the study area

Podilia is the historical and geographical region of Ukraine that is situated between the rivers Pivdenny Bug and Dniester. According to the political division of Ukraine, it occupies the regions Khmelnytski, Ternopol, and Vinnitsa as well as small parts of the regions Cherkassy, Kirovograd, and Odessa. Geomorphologically, the area corresponds to the Podilia Upland. Central Podilia is the central part of the Upland in the borders of Vinnitsa region, with altitudes about 200–300 m a.s.l. The climate is temperate, moderately continental with a mean annual temperature of 7–9 °C and a mean annual precipitation of 550–650 mm. Typical soil types are chernozem and podzol. In the geobotanical zonation of Ukraine, the territory



Central Podilia at the physiographic map of Ukraine.

corresponds to the Central-Podilian geobotanical district of the oak and hornbeam-oak forests as well as steppe-meadows.

Central Podilia is characterized by great diversity of dry grasslands, including vegetation of stony outcrops, particularly the granite outcrops of the Ukrainian Crystalline Shield in the Pivdenny Bug River valley (order *Trifolio arvensis-Festucetalia ovinae*, class *Koelerio-Corynephoretea*) and the limestone outcrops in the Dniester River valley (order *Alyssosedetalia*, class *Koelerio-Corynephoretea*). At the slopes of the both valleys, various types of steppe vegetation are widely distributed (alliances *Festucion valesiacae* and *Cirsio-Brachypodium pinnati*, class *Festuco-Brometea*), with the dominance of *Stipa capillata*, *S. lessingiana*, *S. pulcherrima*, *Botriochloa ischaemum*, and *Carex humilis*. There are also small patches of forest-edge vegetation (class *Trifolio-Geranietea*).

Idea of the joint expedition

Despite the fact that Ukraine belongs to the countries with the most diverse and extensive dry grasslands on the continent, available data and analyses are generally still rather limited (see Kuzemko 2009), and this is particularly true for the study region of this year's EDGG expedition. Based on the originality and high geomorphological diversity of the region combined with very limited vegetation data available from there, we assume that our expedition will yield important new baseline data for large-scale classification, analyses of diversity patterns and conservation issues. There is a good chance that we will have to describe new syntaxa based on the data sampled.

We have developed a sampling approach that provides high-quality data that are useful both for consistent large-scale classification and analyses of diversity patterns at multiple spatial scales. A very similar approach has previously been applied for example during the first EDGG field expedition 2009 in Transylvania, Romania (for a first report, see Dengler et al. 2009b), and by Steffen Boch in Estonia (e.g. Boch & Dengler 2006, Dengler & Boch 2009). For more detailed arguments on individual aspects of the sampling strategy, see e.g. Dengler (2009), Dengler et al. (2009a), Berg & Dengler (2005).

Our aim is to sample the full variety of dry grassland types in Central Podilia, both in geographical and in ecological terms. For this purpose, our expedition will visit different dry grassland areas every day, which are spread in the study region and which will be identified by the Ukrainian colleagues beforehand based on available data (local publications, species distribution information from floras, aerial photographs, maps, etc.). Within each of these dry grassland areas, we will aim to cover the range of occurring types that are distinguishable in the field (in terms of physiognomy and site conditions). They will be sampled with two complementary approaches:

Nested-plot sampling for biodiversity analyses on plots sized 0.0001 m²; 0.001 m²; 0.01 m²; 0.1 m²; 1 m²; 10 m²; 100 m², with all areas below 100 m² being replicated twice within the largest plot. Here we will sample complete species lists of vascular plants, bryophytes and lichens.

Vegetation relevés on 10 m² (10-m² subplots of the nested design + additional individual relevés): percentage cover value of all species (vascular plants, bryophytes, lichens); structural data (height and cover of layers); GPS coordinates (latitude, longitude, altitude); relief (inclination, aspect, relief position, microtopography); land use; soil depth, stone cover. Further, a mixed soil sample of the uppermost 15 cm will be drawn for subsequent lab analyses of basic chemico-physical parameters (pH; carbonate, conductivity, loss on ignition, soil texture class, skeleton content).

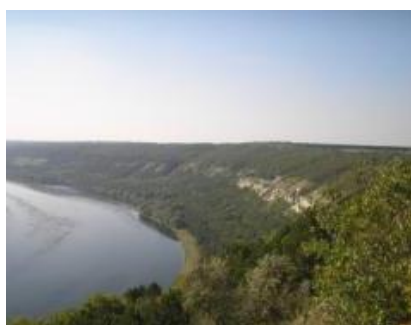
For this sampling, we will divide our expedition in several multinational subgroups, each of which should comprise specialists for the various plant taxa. At the start of the expedition, we will have a short training course to introduce all participants to the sampling approach, in order to achieve data of high and consistent quality. One fundamental idea of these EDGG field expeditions, apart from gathering valuable new data from underrepresented regions of Europe, is the transfer of knowledge among EDGG members, both regarding species determination and methodological approaches of sampling, databasing and analysing the data.

All the data sampled jointly, will be integrated into the supranational database of SEEDGG (see announcement by Iva Apostolova in this Bulletin). We intend to prepare various publications from the data for international journals (e.g. *Applied Vegetation Science*, *Ecography*, etc.), in which all participants for the field expedition will be invited to help with the analyses and serve as co-authors. As the data sampled jointly certainly offers much more analytical options than we have in mind presently, we encourage all participants to develop own ideas of publications and propose them to the team.

If you have questions or suggestions regarding the sampling approach, you are invited to discuss them with Jürgen Dengler. When there are good ideas, we are very open to incorporate them into our sampling. While our general focus is on sampling baseline data on vegetation composition for classification and analyses of biodiversity patterns, there is the option



Pivdenny Bug River valley.



Pivdenny Bug River valley.



Carlina onopordifolia.



Chamaecytisus blockianus.

that some participants sample different data on the same dry grassland patches (e.g. zoological data; tissue samples from plant species for phylogeographical analyses; diaspores and other traits for trait databases; etc.). If you wish to do so, please send your proposal to Anna and Jürgen as soon as possible.

Programme and costs

The expedition will start in Umanø 200 km from Kiev, on 10 July and end in Kiev on 25 July, respectively. The participants should arrange their voyage to Kiev via plane or train themselves. To get from Kiev to Umanø it is best to take a minibuss (fixed-run taxi) ó the bus station is located near the entrance of the central train station in Kiev.

For the expedition, Anna has hired a 18-seat bus including a driver. According to present plans, our accommodation will be in the following towns (see Fig. 6):

- 6): - Uman' (1 night before expedition)
- Nemirov (3 nights)
- Kryzhopolø(1 night)
- Chechil'nyk (3 nights)
- Yampil' (2 nights)
- Mohyliv-Podil'skyi (4 nights)



We will stay either in cheap hotels, sanatoria or similar places. The overall costs (travelling during expedition [bus rent, driver, petrol], accommodation, meals) will be approximately 250 Euros per person. Jürgen has applied for a grant by FAN (B) (= *Förderkreis für allgemeine Naturkunde (Biologie)*), and we are optimistic that they will cover a significant proportion of the expedition costs in Ukraine and potentially also part of the costs for foreign participants to get to Kiev. We will know more after mid-April. Accordingly, when you apply, you need to take into account that you possibly have to cover the full costs or part of them yourself.

If you have any ideas where to apply for additional support, please let us (Anna and Jürgen) know. Similarly, you should inform us if you don't need financial support for your part because your costs are covered by a different source. We would like to assign the financial support that we receive with priority to those who need it most, i.e. the participants from low-income countries who otherwise might not be able to participate.

As soon as the list of participants has been fixed (around 20 April), we will involve all of them into the further discussion about the details of the expedition.

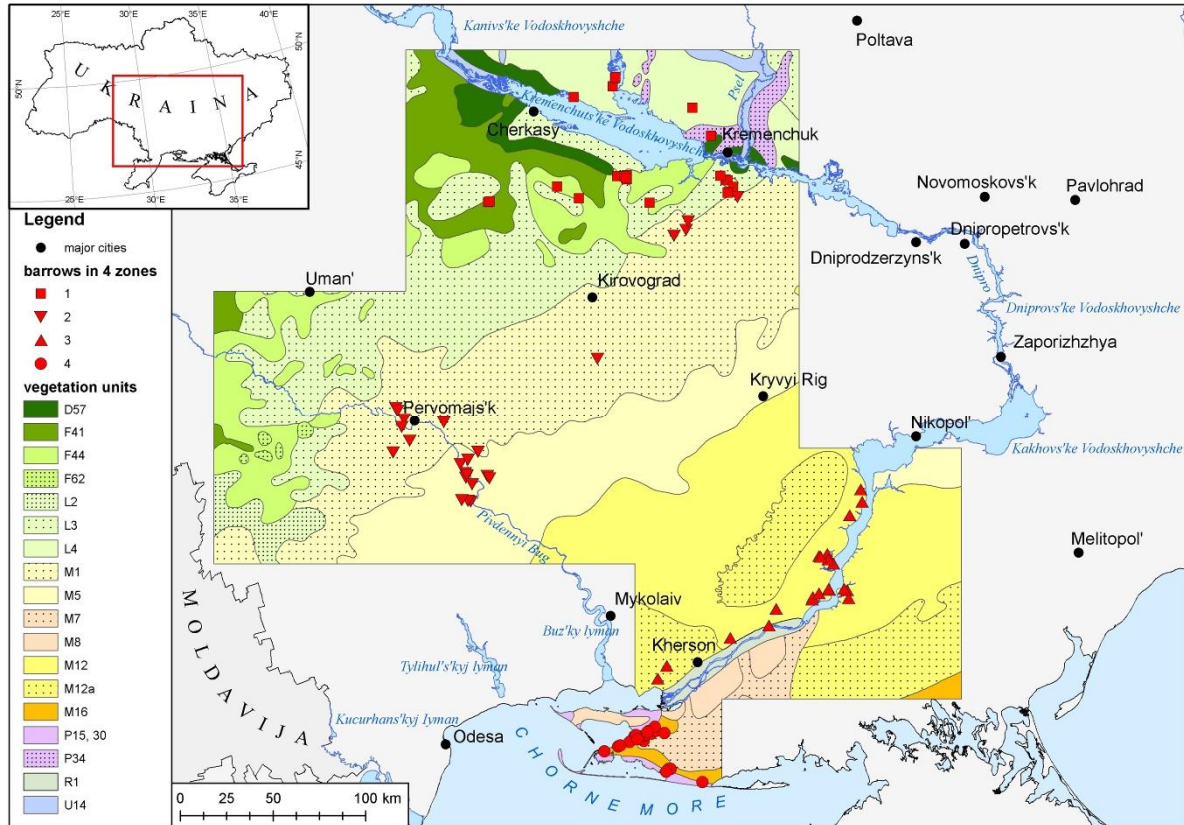
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Kurgans of Ukraine as a refuge of steppe flora



Map: Location of the studied area (zones according to Map of the natural vegetation of Europe, Bohn et al. 2000).

The greatest concentration of kurgans in the world can be found in the steppe zone. Within Europe, the largest number of kurgans exists in Ukraine where they form a characteristic and unique element of the landscape.

Kurgans, known also as barrows or mounds, were built by many cultures during different historical periods as burial sites. These conical or dome-shaped burial mounds had a frame constructed of wood (where wood was available), stone or combination of wood and stone. The frame was covered by soil from the surrounding area forming a characteristic mound shape. Each kurgan contained one or several graves with urns or skeletons. The kurgans date from Neolithic times to the early Middle Ages. They are found throughout the temperate zone in Eurasia (e.g., Great Britain, Poland, Russia, and Mongolia). The oldest kurgans in Ukraine were built over 5500 years ago. The most recent ones are over 700 years old. They date from the Copper Age, Bronze Age, Early Iron Age, Pre-Roman and Roman Times, Migration Period to Middle Ages. Kurgans were constructed by

nomadic populations of Cimmerians, Scythians, Sarmatians, Huns, Bulgarians, Magyars, Polovtsians, Nogays and others.

It is generally accepted that originally there was about half a million kurgans in the current territory of Ukraine. Today only 50 to 100 thousand kurgans remain. These remaining kurgans are usually 1 to 10 (up to 24) meters high and range from 8 to 100 (up to 180) meters in diameter. Some of them are still used as cemeteries (Fig. 1)

On a European scale, steppe vegetation has been destroyed to a greater degree than any other type of zonal vegetation. Before the taming of the steppe, which occurred about 200 years ago in southern Ukraine, the barrows were surrounded by virgin steppe vegetation. These surroundings promoted formation of the plant cover similar to the natural steppe vegetation on the mounds. Nowadays, about 82% of the steppe area in Ukraine has been destroyed due to agricultural activities (plowing) and development of human settlements. The original conditions of the

mounds are preserved to different degrees for each kurgan which has survived until today. In the 1970s an action against the kurgans was taken. Smaller kurgans were destroyed and incorporated into agricultural fields. Fortunately, the bigger burial mounds have remained and are now registered as archaeological monuments. Kurgans are extremely valuable objects for archeological studies. Our investigation showed that kurgans are valuable for scientific studies of plant cover and nature preservation. Very few botanical studies on kurgans have been carried out so far (e.g. in Hungary: Barczy, Jó 2000, Barczy 2003, in Bulgaria: Paczoski 1933, in Poland: Cwener 2004, 2005).

Our research on the flora of the kurgans in the steppe zone was initiated in 2004 and conducted through to 2007, as part of a grant financed by Polish Ministry of Science and Higher Education titled "Kurgans as a refuge of steppe flora in the agricultural landscape of southern Ukraine". This research has been extended to study the kurgans of forest steppe zone by obtaining a subsequent grant which started in 2008 and will conclude in 2011. During our expeditions we evaluated about 450 kurgans in four climatic-vegetation zones of Ukraine (see the map) according to the nomenclature proposed by Bohn et al. 2000). We have chosen 106 of the best preserved kurgans (Fig. 2) to study their flora: 26 in the desert steppe zone, 26 in the west Pontic grass steppe zone, 29 in the Pontic herb-rich grass steppe zone and 25 in the forest steppe zone (Moysiienko, Sudnik-Wójcikowska 2006, 2009, Sudnik-Wójcikowska, Moysiienko 2006, 2010). We conducted research by defining abundance of each species using three-point scale. We evaluated five microhabitats of a kurgan: 1) the top, 2) the south slope, 3) the north slope, 4) the south foot (base) and the north foot. Characteristics of the flora of kurgans are detailed in Table 1 and the above publications.

Characteristics of the flora of kurgans.

We concluded the following:

The richness of the flora of evaluated kurgans exceeded 700 species and increased in each zone from south to north (other floristic parameters see Table 1). In this gradient we have observed a decrease of therophytes (annuals) and an increase of hemicryptophytes and phanerophytes. Thus, floristic composition of the kurgans reflects principles observed on much bigger scale in the flora of climatic-vegetation zones. In contrast, floristic composition of areas surrounding kurgans in different zones is quite monotonous with domination of native and foreign weeds: archeophytes and kenophytes.



Fig. 1 (upper picture) Some kurgans are still used as cemeteries. Fig. 2 Investigated kurgans in zones: a) in the desert steppe; b) in the west Pontic grass steppe; c) in the Pontic herb(-rich) grass steppe; d) in the forest steppe. Photos: I. I. Moysiienko, B. Sudnik-Wójcikowska .

The distribution of species in microhabitats of kurgans shows certain patterns, especially in the slope and the foot microhabitats (Sudnik-Wójcikowska, Moysiienko 2008a). The majority of steppe species occur in the slope microhabitats of kurgans, with north slopes richer than the south. In this microhabitat we found many species listed in Red Data Books and Red Lists of different importance (Figs. 3,6,7; Moysiienko, Sudnik-Wójcikowska 2008a, 2008b). Some of these species occurred in abundance. We found several species of international importance: *Allium regeilianum* A.Becker ex Iljin, *Astragalus dasyanthus* Pall., *A. pallescens* M.Bieb., *Dianthus lanceolatus* Steven ex Rchb., *Eremogone rigida* (M.Bieb.)Frenzl, *Galium volhynicum* Pobed., *Linaria biebersteinii* Besser, and *Phlomis hybrida* Zelen. Some species, listed in the Red Data Book of Ukraine, were especially valuable for the country: *Adonis vernalis* L., *A. wolgensis* Steven, *Stipa lessingiana* Trin. & Rupr., *S. ucrainica* P.Smirm., *Tulipa biebersteiniana* Schult. & Schult f. s.l., *T. schrenkii* Regel. In these slope microhabitats we also found many species, listed in Ukrainian regional Red Books, including: *Amygdalus nana* L., *Anemone sylvestris* L., *Hesperis tristis* L., *Hyalanthella leucophaea* (K.Koch) Schur, *Muscari neglectum* Guss. ex Ten., *Iris pumila* L., *Iris hungarica* Waldst. & Kit., *Salvia austriaca* Jacq., *S. nutans* L. In contrast to the slope microhabitats, we found that the foot microhabitats have higher concentration of meadow species, trees and shrubs due to higher moisture content of the soil. The further north, the more tree and shrub species can be found (e.g. *Acer tataricum* L., *Amygdalus nana* L., *Fraxinus excelsior* L.).

Synanthropization of flora is visible on kurgans (Sudnik-Wójcikowska, Moysiienko 2008b). The tops of the kurgans are frequently disturbed by triangulation towers, old crosses, etc. Similarly, the bases of the kurgans show signs of human impact. Besides meadow species we found common weeds from nearby agricultural fields. We also found species which have always accompanied human settlements but are nowadays rare and slowly disappearing, such as *Adonis aestivalis* L. and *Bupleurum rotundifolium* L. Frequently, besides native species, we found foreign species of trees and shrubs such as *A. negundo* L., *Fraxinus pennsylvanica* Marshall and *Robinia pseudoacacia* L.

Our research confirmed that the kurgans constitute a unique refuge of steppe flora. It seems that they can also provide refuge for the flora of bryophytes, fungi, lichens and certain animal species. Research in this area, however, remains very limited.

Kurgans are human-made structures which have persisted in the steppe landscape for hundreds or even thousands of years. The vegetation of kurgans was probably similar to the vegetation of the surrounding area until the steppes were plowed. It may also be assumed that the vegetation of the plain steppe (Ukrainian: *öplakornyj stepö*) was destroyed first and most comprehensively, and is now practically absent from large areas of Ukraine. This vegetation is slightly different from the enclaves of natural vegetation, e.g. in river valley sides, ravines, canyons and in balkas, where soil is subject to more severe erosion and rock is exposed. It cannot be excluded, therefore,

that the present-day vegetation, particularly that of the slopes of kurgans, reflects to some degree the plant composition and structure of the former plain steppe flora.

Large-scale land cultivation led to the scattered distribution of higher kurgans, which resemble *öislandsö* or enclaves of more or less well preserved natural vegetation in a sea of field vegetation. Kurgans, therefore, constitute very interesting focus for research on isolation, environmental islands, etc. In areas where they occur in high numbers, kurgans can constitute important cen-



Fig. 3 Most interesting kurgan species: *Adonis vernalis*, *Stipa capillata*, *Astragalus dasyanthus*, *Hesperis tristis*. Photos: I. I. Moysiienko, B. Sudnik-Wójcikowska.



Fig. 4 Authors of the contribution on kurgan.



Fig. 5 Protection of kurgans as archaeological sites.

ters of the steppe biodiversity, even on a European scale. As such, they are starting points for the expansion of steppe species to adjacent areas, for example, to abandoned fields. In the future they may play an important role in the restoration of steppes.

It is also known, on the base of earlier paleobotanical research conducted by Ukrainian scientists, that kurgans contain valuable palinological and karpological materials containing preserved information on the diversity of flora during the periods when the kurgans were constructed. These materials, in conjunction with archeological data and relatively precise dating system, could help to reconstruct history of flora and paleoclimatic changes of the area.

Because of their importance, kurgans should be protected not only as archeological monuments (Fig. 5) but also as valuable nature preserves. Studies on biodiversity provide strong arguments to support the conservation of kurgans.



Fig. 6 *Ephedra distachya* and *Tulipa schrenkii*. Photos: I. I. Moysiienko, B. Sudnik-Wójcikowska.

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Table 1. Characteristics of the flora of kurgans in the three steppe zones and in the forest zone

Characteristics of the kurgan flora in different zones	Zone			
	Desert steppe (D)	West Pontic grass steppe (P)	Pontic herb-rich grass steppe (R)	Forest steppe (F)
Total number of species	305	355	435	460
% of total described flora of kurgans in 4 zones (721 species)	42,3	49,2	60,3	63,8
The average number of species per kurgan	82,3	110,0	125,5	107,5
Minimum and maximum number of species on a kurgan	48-103	72-141	89-171	85-189
% of native species in kurgan flora	77,2	70,4	74,2	75,4
% of nonsynanthropic species in kurgan flora	39,6	38,9	41,2	41,8
% of steppe species	41,0	56,1	49,9	49,0
% of alien species (anthropophytes) in kurgan flora	22,8	29,6	25,8	24,6

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Fig. 7 Tulipa bibersteiniana and Iris pumila. Photos: I. I. Moysiienko, B. Sudnik-Wójcikowska.

Mediterranean Type Ecosystems (MTEs): a brief introduction

Mediterranean type ecosystems (MTEs) of the world have a rather wide distribution (Fig. 1), since they extend over (i) the 17 circa Mediterranean countries (European, African and Middle East), (ii) the southern parts of the states of South Australia, Victoria, and Western Australia, (iii) all of the U.S. state of California, excluding desert and steppe, reaching into small parts of the state of Oregon and the Mexican state of Baja California, (iv) the middle third of central Chile in South America, and (v) limited to a small area of coastal the Western Cape and Eastern Cape provinces in South Africa (Trzyna 2004). The circa-Mediterranean areas amount to 1.4 million km² with around half (693,000 km²) found on the European side.

MTEs are characterized by a particular ecological setting that supports an exceptionally rich life in terms of flora and fauna and, as historically proven, offer exemplary conditions for humans to display their creative power in building what is called modern western civilization. Climate is the dominant feature of the Mediterranean areas. It is characterized by the interchange of a rainy season in the cold months with a dry season in the warm months. However it is the stochastic spatial and temporal variation of the climatic pattern (mostly in terms of rainfall and air temperature) that underpins this climate uniqueness. Another peculiarity of Mediterranean areas is related

to topography and soils. Topographic variations include limited flat plains, but numerous elevated plateaux, hills and mountains, thus resulting in a very rugged and highly dissected landscape. Soils are mostly derived from calcareous formations. Based on the FAO's World Reference Base for Soil Resources the dominant Mediterranean soil groups are leptosols (typically mountainous soils where soil formation is counteracted by denudation), regosols (commonly found in eroded landscapes), cambisols (widespread across the Mediterranean in soils with a cambic horizon appearing in erosion deposits), and others like luvisols (soils with argic, white clay, horizon), nitisols (with high iron content, not too vulnerable to erosion), vertisols (in low-lying, level, landscape positions with characteristic alternating wet-dry conditions), gypsisols (common in the drier eastern Mediterranean parts of Turkey, Syria and north Africa, suitable for extensive livestock grazing), and calcisols (where calcium carbonate is present in the soil) (Spaargaren 2006). Characteristic climatic and soil variations are the sources of supporting the rich flora (and fauna) met in Mediterranean areas. It is estimated that the Basin hosts approximately 11,700 endemic plant species, which is more than four times the number found in all the rest of Europe, and often comprise up to 40% of plant species lists (Guccione 2000). Although MTEs cover only about 2.25% of the Earth's land area, they contain 20% of its named

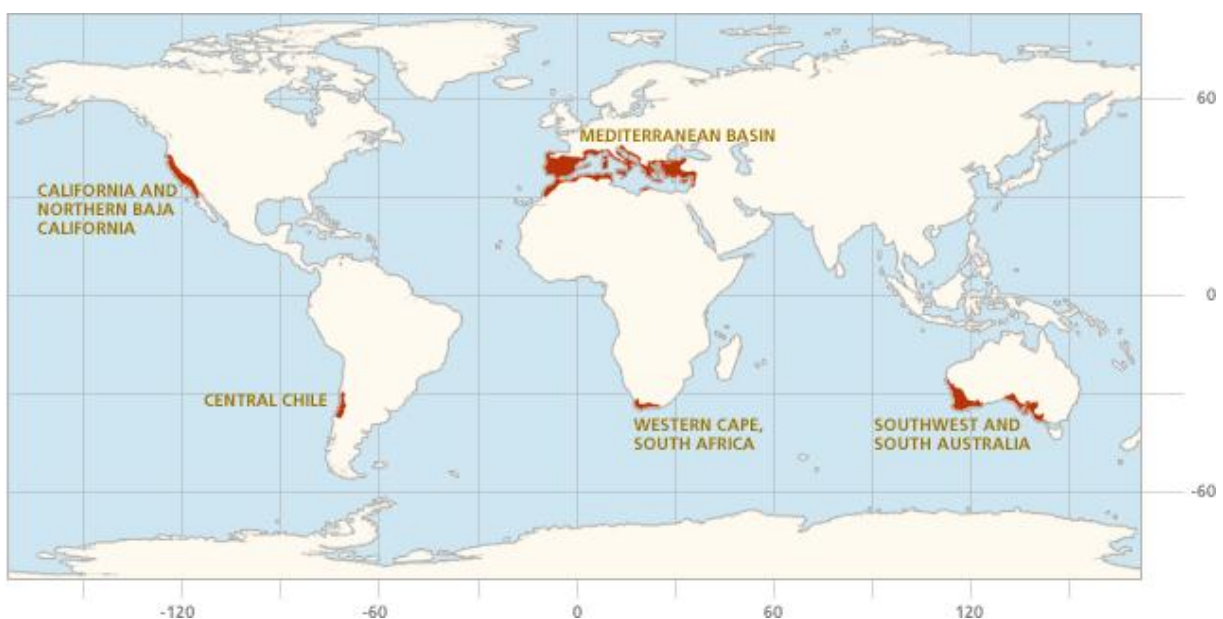


Fig. 1 MTEs of the globe. Source: California Mediterranean Research Learning Center (National Park Service, U.S. Department of the Interior). Source: <http://www.researchlearningcenter.com/pages/about.html>

vascular plant species, including over 26,000 endemic species. Together with flora, Mediterranean fauna is exceptionally rich; 75% of the total European insect fauna are found in the Basin; from Iberia to Turkey 131 of the 300 freshwater fish species are regional or local endemics; the Basin also harbors 165 reptile species, with 113 of which are endemics as well as 63 amphibian species, with 37 of them being endemics; there may be as many as 366 bird species compared to 500 for the whole of Europe; approximately 197 species of mammals occur in the Basin, 25% of which are endemics (information quoted from Blondel and Aronson (1999) where specific references are cited). The large variety of vegetation types is seen as a consequence of the particular ecological setting of the Mediterranean areas and human intervention as well. Apart from coastal, halophytic, dunes and freshwater, other characteristic Mediterranean group of habitats include heaths, sclerophyllus scrubs, natural and semi-natural grassland formations, rocky habitats and forests. Mediterranean rangelands, which are viewed as a composite vegetation type mainly associated with livestock grazing, include halophytic steppes dominated by Chenopodiaceae, permanent (native) grasslands grown in dry (pelouse) or wet (meadow) sites, dwarf shrublands grown in semiarid areas and dominated by several dimorphic half-shrubs (e.g. phrygana, batha, tomilares), shrublands grown in semi-arid and sub-humid areas dominated by evergreen or deciduous shrubs of several sizes (e.g. garrigues, maquis, matorral) and open forests or woodlands (dehesas, montdos) partially covered (up to 40%) by trees like oaks, pines, cypress, etc (Fig. 2) (Papanastasis and Mansat 1996). Just to give some figures, out of the 218 habitat types of community interest recorded in the EU habitat Directive, Spain hosts 116, Greece 109 (21 of them considered as priority habitats)¹ and Italy 127 (31 of them considered as priority habitats) (Dafis *et al.* 2001, Bartolomé *et al.* 2005, Petrella *et al.* 2005). Finally, the complex Mediterranean land use systems are characterized by a mixture of irrigated and thus intensively cultivated areas, rainfed arable lands with cereals, grasslands and tree crops, and marginal territories devoted to wood production and extensive livestock grazing.

MTEs are global conservation priorities since they face several threats. Biodiversity loss in these systems is among the greater immediate threats compared to any other species-rich regions; water scarcity is underpinned by many factors like climate change, improper use and natural spatial and temporal stochasticity; water quality suffers from accumulation of pollutants on the ground during dry periods, followed by rapid and heavy rains; wildfires, although associated with some plant species regeneration, are de-

structive for humans and property; climate change is expected to result in even warmer and drier conditions as contemporary climatic models predict; sprawling cities, informal settlements, expanding resorts and agricultural communities, and second homes in the countryside, all products of modernization, urbanization and human population growth; conventional tourism imposes environmental stress; clearing of natural vegetation, irrational grazing, forest reforestation and abandonment of traditional land use practices result in shrinkage of natural areas; species invasion threatens natural balances and physiognomic characteristics; and desertification has started gradually to appear in the driest extremes of the MTEs.

The tragedy of commons and the lack of under-



Fig. 2 A traditional dehesa-like valonia oak (Quercus ithaburensis subsp. macrolepis (Kotschy) Hedge & Yaltirik) silvo/grassland system in Kea island (Greece). Photo: G. Fotiadis.

standing are behind the apathy of humans - and especially of the Mediterranean people - to take drastic actions to mitigate the consequences of MTE degradation. To this end, EDGG through its Med-DG subgroup appears as a scientific agent to bring the bellö and bring into action institutions for conserving and protecting these valuable ecosystems.

¹Or according to Papastergiadou *et al.* (1997): *Of the 226 Habitat Types listed in Annex I of Directive 92/43/EEC, 111 different Habitat Types are present in Greece, of which 26 are Priority Types.*

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Fig. 3 Natural and man-made patchworks in Mediterranean landscapes (pseudomaquis shrubland, dry grassland, pine afforestation in northern Greece). Photo: M. Vrahnakis.

Dry grassland habitat types of Greece

Greece is considered as a typical Mediterranean country, since MTEs cover more than 90% of its area. It is estimated that the vascular flora of Greece sustains high richness, as it harbors 6437 native plant taxa or approximately 5800 species, 15.6% of them being endemic (Strid and Tan 2002, Georghiou and Delipetrou 2010). It has been shown that Greece has 2.1 times the normal endemism for its area, which is lower than the exceptionally high-ranking Canary Islands (9.3), but comparable with Turkey and Cyprus (approximately 2) and higher than Bulgaria, Italy, the Iberian Peninsula and the Balearics and Morocco (0.761.2) (Georghiou and Delipetrou 2010). The rich flora of Greece is considered as the product not only of its Mediterranean ecological setting, but of human activities as well. This exceptional interplay between Mediterranean biosystems (human included) and abiotic conditions is perfectly illustrated in areas that historically have been a common space of nature and humans (Figure 1). *Grassland* is the perfect paradigm.

Despite several uncertainties, originating mainly from the blurred proprietary regime that suppresses effective management and conservation of the natural resources of Greece, it is estimated that rangelands (i.e. natural and semi-natural areas where extensified or semi-intensified livestock husbandry takes place) comprise up to 45% of the total country area, making it the most common land use type of Greece (Papanastasis 2009). The natural and semi-natural grasslands of Greece are a specific type of rangeland. They comprise up to 33% (1.7 million hectares) of the total rangeland area, thus significantly contribute to the national economy not only because they sustain livestock husbandry (mainly sheep and cattle), but also because they offer inestimable services to human well being (Figure 2) (Vrahnakis *et al.* 2010).

According to information provided by the *Technical Guide for Identification, Description and Mapping of Habitat Types*, Greece harbors eight (8) grassland habitat types, three (3) of them (6110*, 6220*, 6230*) being priority habitats (Dafis *et al.* 2001).

Regarding its area, this number of Natura 2000 grassland habitat types is considered rather high, at least in respect to other European countries (Table 1).

Few specific studies on the ecology, phytosociology, flora and fauna of dry grasslands of Greece have been conducted to date. Additionally, no specific and detailed inventory or monitoring program has been developed. This is an attempt to describe the dry grasslands of Greece, based on the pioneer work of Dafis *et al.* (2001), followed by Kakourou (2002), and of course its complete description is a great chal-



Fig. 1 Evidences from ancient status found in Greece revealing strong bonds between humans and livestock grazing. Left: Moschoforos Kouros (kouros¹ the calf-bearer), Archaic sculpture (570 BC - 530 BC), Acropolis Museum. Right: Hermes Kriophoros (Hermes the ram-bearer), c. 225 AD.

¹The archaic word *kouros* means *young man*. The word is used to describe ancient Greek statues of handsome, strong, young men from the archaic era (750 BC ó 500 BC). The modern Greek word *koura*, which is used to describe the wool-cutting activity of grazing animals which takes place during the hot summer period, shows the diachronic message of the word.

lenge for rangeland ecologists, botanists and zoologists as well.

The vast majority of the grasslands of Greece may be considered as dry grasslands (with the exceptions of 6430 and components of 6420 and 6510), in the sense that they are mostly found in dry sites (in terms of water availability and climate as well) and in poorly developed soils:

(i) The priority grassland habitat type 6110* (*Rupicolous calcareous/basophilic grassl. Alyssosedion*), which is closely related to the *Xerobromion* and *Mesobromion* associations (in Belgium and Germany), harbours open xerothermophile pioneer communities on superficial karstic calcareous or basophilic soils dominated by annuals and succulents (*Poa timoleontis*, *Festuca* sp., *Arenaria leptoclados*, *Muscari botryoides*, *Sedum urvillei*, *Ornithogalum* sp., etc.). It is mainly found in inclined slopes (10-40%) and ridges, in south, west, and south-west exposures, and it forms open communities of grasses and herbs (ground cover of 60-90%), with sparsely distributed shrubs (cover 3-6%). It has been recorded in western Macedonia (Mt Vourinos 800 m mean elevation), and Thessaly (eastern Mt Pelion 600 m).

(ii) The grassland habitat type 6170 (*Alpine and subalpine calcareous grasslands*) is found on calcareous or basophile soils, and rarely on flysch or schist, in various slopes and exposures, and in high elevations (1350-2200 m). The habitat comprises valuable resources for livestock husbandry. Characteristic plant species are *Festuca varia*, *Daphne oleoides*, *Astragalus angustifolius*, *Stipa pennata*, *Festuca* sp., *Thalictrum minus*, *Teucrium montanum*, *Eryngium creticum*, *Thymus longicaulis*, *Thymus sibthorpii*, etc. Characteristic grasslands of this habitat type are found in eastern Macedonia (Mt Paggeo 1500 m), central Macedonia (Mt Voras 1600 m, Mt Tzena 1100 m, Mt Paiko 800 m, Mt Menoikio 1500 m) and western Macedonia (Mt Vermio 1300 m, Mt Grammos 1000 m, Mt Siniatsiko 1200 m). The habitat is further distinguished into the sub-types 6173 (*Calciphilus stepped and garland grasslands*) and the Corine type 36.437 (*Greek stripped grasslands Daphno-Festucetalia*) with *Sesleria tenerrima* (= *S. korabensis*), *S. coeruleans*, *Festuca varia* (= *F. gratea*), *Carex kitaibeliana*, *Stipa pulcherrima*, *Viola heterophylla* ssp. *gratea*, *Minuartia verna*, *Paronychia rechingeri*, *Silene ciliata*, *Diantus minutiflorus*, *Draba athoa*, *Iberis sempervirens*, *Anthyllis vulneraria* ssp. *pulchella*, *Acinos alpinus*, *Edraianthus graminifolius*, *Centaurea pindicola*, *Galium anisophyllum*, *Morina persica*, *Bornmuellera baldaccii*, *B. tymphaea*, *Poa alolosa* (= *P. pirinica*), *P. thessala*,

Festuca olympica and the shrubs *Daphne oleoides* and *Juniperus nana*.

(iii) The grassland habitat type 6210 (*Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)* (* important orchid sites)) is found on various exposures (plain, ridges, slopes, etc.) and geological substrates, but mostly on calcareous rocks and serpentines. The grasslands of this type are considered overgrazed with eroded soils, but they are distinguished by their high number of endemic and rare plant taxa. They are met in high elevations of northern Greece (800-2200 m), in medium elevations of Evia island (700-1000 m) and in low elevations in Kriti island (350-450 m). Characteristic species are *Festuca valesiaca*, *Geranium rotundifolium*, *Chrysopogon gryllus*, *Thymus longicaulis*, *Alyssum murale*, *Bornmuellera tymphaea*, *Festuca* sp., *Brachypodium pinnatum*, *Artemisia campestris*, etc. Grasslands of this habitat type are found in eastern Macedonia (Mt Falakro 1600 m, Partheno Forest of Mt central Rodopi 1560 m, Mt Paggeo 1500 m), central Macedonia (Mt Tzena 1100 m, Mt Menoikio 1500 m, Mt Orvilos 1700 m, area of Tempi), western Macedonia (Mt Vermio 1300 m, Mt Vasilitza 1100 m, Valia Calda 1590 m, Mt Vourinos 800 m, Mt Siniatsiko 1200 m, Mt Varnountas 1000 m, area of the lakes Vegoritida and Petron 640 m, in Epirus (Mt Zygos in Metsovo 1360 m), in Evia island (Mt Kandili 1500 m) and in Kriti island (hills of Chersonisou 300 m). The subtype 6211 is characterized by the dominance of *Festuca valesiaca*, and is found in elevation range 800-1800 m (except the area of Evros where it is found on plains of 100 m elevation). It forms open communities of grasses and herbs (ground cover of 40-100%), with sporadically distributed shrubs. In the area of Evros it is distinguished by the presence of orchids. Grasslands of this habitat subtype are found in Thrace and eastern Macedonia (area of Treis Vrysses 650 m, hills of Evros 210 m, Mt Symida 1137 m), area of Elatia 1300 m, peak of Mt Falakro 1600), central Macedonia (Mt Pieria 1200 m, Mt Krousia and the peak of Mt Belles, 1200 m, Mt Varnountas 1000 m).

(iv) The priority grassland habitat type 6220* (*Pseudosteppe with grasses & annuals Thero-Brachypodietea*) is based on carbonic substrates (limestone, marbles) in mountainous areas and on sandy substrates in areas of low elevation zone. Dominant species are *Centaurea grisebachii*, *Convolvulus cantabrica*, *Tuberaria guttata*, *Dichanthium ischaemum*, *Stipa capillata*, *Stipa capensis*, *Chrysopogon gryllus*, *Hypericum olympicum*, *Jurinea mollis*, *Silene galinyi* and other typical of Thero-Brachypodietea: *Aira elegantissima*, *Brachypodium distachyon*, *B. retusum*, *Aphanes minutiflora*, *Bromus*

Table 1 Distribution of European grassland habitats into the biogeographical regions of Europe (ALP=Alpine; ATL=Atlantic; BOR=Boreal; CON=Continental; MAC=Macaronesian; PAN=Pannonian, MED=Mediterranean) (sources: (i) EIONET/European Topic Centre on Biological Diversity/EEA, (ii) for Greece: Dafis et al. 2001).

European grassland habitats	Biogeographical region							GREECE
	ALP	ATL	BOR	CON	MAC	PAN	MED ¹	
6110* - Rupicolous calcareous/basophilic grassl. Alysso-Sedion	X	X	X	X		X	X	X
6120* - Xeric sand calcareous grasslands		X	X	X		X	X	
6130 - Calaminarian grasslands of the <i>Violetalia calaminariae</i>	X	X		X			X	
6140 - Siliceous Pyrenean <i>Festuca eskia</i> grasslands	X	X						
6150 - Siliceous alpine and boreal grasslands	X	X	X	X				
6160 - Oro-Iberian <i>Festuca indigesta</i> grasslands		X					X	
6170 - Alpine and subalpine calcareous grasslands	X	X		X			X	X
6180 - Macaronesian mesophile grasslands					X			
6190 - Rupicolous Pann. grassl. <i>Stipo-Festucetalia pallentis</i>	X			X		X		
6210 (*) - Seminatural dry grassl. & scrubland facies on calc. sub	X	X	X	X		X	X	X
6220* - Pseudosteppe with grasses & annuals Thero-Brachypodietea	X	X		X			X	X
6230* - Species-rich <i>Nardus</i> grasslands, on siliceous substrates	X	X	X	X		X	X	X
6240* - Sub-continental steppic grasslands	X	X		X		X		
6250* - Pannonic loess steppic grasslands	X			X		X		
6260* - Pannonic sand steppes				X		X		
6270* - Fennoscandian lowland species-rich dry to mesic grassl.			X	X				
6280* - Nordic alvar and precambrian calcareous flatrocks			X	X				
62A0 - Eastern sub-med. dry grassl. (<i>Scorzonerata villosae</i>)	X			X			X	
62B0* - Serpentinophilous grasslands of Cyprus							X	
6310 - Dehesas with evergreen <i>Quercus</i> spp.							X	
6410 - <i>Molinia</i> meadows on calc./peaty/clavey-silt-ladean soils	X	X	X	X		X	X	
6420 - Med. tall humid grassl. of the <i>Molinio-Holoschoenion</i>	X	X		X	X		X	X
6430 - Hydrophilous tall herb fringe comm. of plains & montane	X	X	X	X		X	X	X
6440 - Alluvial meadows of river valleys of the <i>Cnidion dubii</i>		X		X		X		
6450 - Northern boreal alluvial meadows	X		X					
6460 - Peat grasslands of Troodos							X	
6510 - Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba</i>)	X	X	X	X		X	X	X
6520 - Mountain hay meadows	X	X	X	X		X	X	
6530* - Fennoscandian wooded meadows			X	X				
Total (from 29 European grassland habitats)	18	17	13	22	2	13	17	8

¹ The eastern Adriatic (Slovenia, Croatia, Bosnia & Herzegovina, Montenegro, Albania) and the northern African coasts are not included in the Mediterranean biogeographical region (according to EIONET).

hordeaceus, *Euphorbia rigida*, *Filago gallica*, *Hypochaeris glabra*, *Linum strictum*, *Lotus halophilus*, *Ornithopus compressus*, *Trachynia distachya*, *Stipa capensis*, *Vulpia ciliata*, *Bellis annua*, *Andropogon distachyos*, *Plantago albicans*. Vegetation may also include representatives from other classes of dry grasslands and Mediterranean steppes, like *Vulpia myunos*, *Trifolium campestre*, *Myosotis ramosissima*, *Asphodelus ramosus*, *Convolvulus althaeoides*, *Hyparrhenia hirta*, *Psoralea bituminosa*. Quite often, early-successive annuals appear: *Anthemis rigida*, *Plantago weldenii*, *Polypogon maritimus*, *Echinops spinosissimus*, *Glaucium flavum* or the synanthropics *Geranium molle*, *Asphodelus fistulosus*, *Aphanes arvensis*, *Bromus madritensis* and *Anthemis arvensis*. Communities dominated by *Carlina corymbosa* subsp. *graeca*, *Atractyllis cancellata*, *Piptatherum coeruleum*, *Centaurium tenuiflorum*, *Crepis multiflora*, *Hirschfeldia incana*, *Leontodon tuberosus* and *Hainardia cylindrica* (in areas occasionally water-logged areas) have also been recorded. Quite high frequencies are observed for the following Thero-Brachypodietaea: *Silene colorata*, *Trifolium stellatum*, *Anthemis chia*, *Catapodium rigidum*, *Arenaria leptoclados*, *Hypochaeris achyrophorus*, *Filago pygmaea*, *Galium murale*, *Lagurus ovatus*, *Misopates orontium*, *Parentucellia latifolia*, *Tolpis barbata*, *Scandix australis*, *Scorpiurus muricatus*, *Sherardia arvensis*, *Avena barbata*, *Plantago coronopus*, *Trifolium scabrum*, *Psilurus incurvus*, *Echium arenarium*, *Cynosurus echinatus*, *Hyoseris scabra*, *Filago eriocephala*, *Erodium cicutarium*, *Polycarpon tetraphyllum*, *Bromus sterilis*, *Malva parviflora*, *Erodium malacoides*, *Trifolium nigrescens*, etc. In silt and plain localities, species from Isoeto-Nanojuncetea (temporary ponds) like *Centaurium pulchellum*, *Juncus bufonius*, *J. capitatus*, *Lotus conimbricensis*, *L. angustissimus*, *Ranunculus paludosus* and *Crassula tillaea* appear. Also phrygana like *Sarcopoterium spinosum* or *Cistus creticus* are often presented in the habitat. Grasslands of this habitat type are found in Thrace (hills of Evros 210 m), central Macedonia (Mt Pieria 1200 m, the area of Alyki-Citros 1 m, area of the lagoon of Agios Mamas 2 m), western Macedonia (Mt Varnountas 1000 m, area of the lakes Vegoritida and Petron 640 m), Thessaly (Mt eastern Pelion 600 m, area of Sourpi-Kouri Almyros 1 m, north Sporades islands 285 m, Mts Antihasia and Meteora 500 m), Stereia Ellada (north-west Evia island 450 m, Mt of south-east Parnassus 1200 m, great marsh of Skinias 20 m, Sounio peninsula 187 m), Peloponnesus (Kythira islands 250 m), north-eastern Aegean sea (Agios Efstratios island 150 m, western peninsula of Lesvos island 370 m, gulf of Kalonis in Lesvos island 5 m, gulf of Geras in Lesvos island 360 m, Ikaria and Fournoi islands 500 m), south-eastern Aegean sea (central Karpathos island 500 m, north Karpathos

island 350 m, Nisyros island 200 m, east Kos island 200 m), Cyclades islands (east Astypalaia island 150 m, north Andros island 300 m, Anafi island 180 m, Santorini island 250 m) and in Crete (area of Milatos 80 m, Chrisi island 5 m, north-eastern coast 150 m, Koufonisi island 1 m, Prassianos area 300 m, Ela-fonissos island 48 m, Elos-Topolia area 600 m, Agia Triada area 100 m, Asfendou-Kalikratis area 400 m, Gavdos island 100 m).

(v) The priority grassland habitat 6230* (*Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*) is located in high elevations (over 1600 m) in clay-earth concavities, with various exposures and mild slopes (5-10%) that made the habitat to benefits from slow melting of snow and to withstand water loss, especially during the summer months (Figure 3, left). It forms open communities of dense vegetation (cover 90-100%). Hydrophilous species like *Nardus stricta*, *Luzula spicata* and *Plantago lanceolata* occasionally appear in wet localities (e.g. water springs, streamlets). The habitat is extremely valuable for livestock husbandry, since sustains green forage even in summer months, when other pastures suffer from drought. Characteristic species are *Nardus stricta*, *Thymus longicaulis*, *Plantago holosteum*, *Anthoxanthum odoratum*, *Festuca varia*, *Hieracium hoppeanum*, *Alopecurus gerardii*, *Carex kitaibeliana*, *Festuca peristerea*, *F. hirtoraginata*, *Thymus praecox*, etc. Typical grasslands of this habitat type are found in eastern Macedonia (area of Elatia 1300 m), central Macedonia (Mt Voras 1600 m, Mt Olympos 1600 m, Mt Pieria 1200 m, Mt Titaros 1300 m, Mt Vasilitsa 1100 m), western Macedonia (Mt Grammos 1000 m, National park of Prespes 1000 m, Mt Varnountas 1700 m, Mt Vernon 1500 m), Epirus (Mt Tzoumerka 1698 m, Vikos-Aoos area 1488 m, Mt Smolikas 1200 m, Oreokastro area 1300 m, Mt Peristeri 1700 m), Peloponnesus (Mt Chelmos 1391 m, Mt Panachaiko 1363 m, Mt Erymanthos 1610 m, Mt Parnonas 1250 m, Mt Kyllini 1488 m, Mt Taygetos 1500 m), and Stereia Ellada (Mt Oiti 1600 m, Mt Vardousia 1597 m, Mt Gkiona 1605 m, south-eastern Mt Parnassus 1200 m).

vi) Grasslands of the habitat type 6270 (*Spartum steppes of Crete*) are restricted to the southern dry coasts of the island of Crete. Species from the north African coasts like *Lygeum spartum*, *Erodium crassifolium*, and *Suaeda palaestina* in Koufonisi island (east Crete) (three species indicatives of the most dry habitats of Greece) together with *Viola scorpiuroides*, *Helichrysum conglobatum*, *Fumana thymifolia*, *Asperula crassula*, *Suaeda palaestina*, *Plantago amplexicaulis*, *Limonium graecum*, *Salsola aegaea*, and *Atriplex halimus* are characteristic of this habitat type. It

has been recorded in Crete (northern east coast 150 m, Koufonisi island 1 m).

vii) The habitat type 6280 (*Oro-Mediterranean grasslands of Ononido-Rosmarinetea p.*) is characteristic of the zone of thermophilous oaks and forms open perennial grasslands, rich in chamaephytes. The habitat is usually found on limestone, granite or ophiolite, in elevation of 800 ó 1500 m, and it is dominated by slopes up to 60%. Species composition includes *Festuca* sp., *Melica ciliata*, *Teucrium capitatum*, *Chrysopogon gryllus*, *Astragalus onobrychis*, *Helictotrichum convolutum*, *Hypericum rumeliacum*, *Stipa pennata* ssp. *pulcherima*, etc. It has been recorded in central Macedonia (Mt Vrontous-Lailias 1000 m), and western Macedonia (Mt Vourinos 800 m, Mt Siniatsiko 1200 m, and National Park of Prespa lakes 1000 m). The type is further distinguished in the subtypes of oro-Mediterranean steppes (characterized by *Stipa pennata*, *Festuca auquieri* (*F. duriuscula*), *F. herrieri*, *Koeleria vallesiana*, *Sesleria albicans* var. *elegantissima*, *Heliathemum apenninum*, *H. carum*, *Genista* spp., *Globularia* spp., *Ononis striata*, *Euphorbia seguieriana*, *Potentilla crantzii*, *Thymus dolomiticus*, *Plantago argentea*, *Rosa pimpinellifolia*, *Dianthus sylvestris*, *Lavandula angustifolia*, *Aster alpinus*, *Anthyllis* spp., and *Carex humilis*) and dry grasslands of Ostryo-Carpinion of eastern Mediterranean (grasslands of this subtype often coexists with grasslands of Festucetalia valesiacae and are dominated by *Carex humilis* or *Festuca rupicola*).

ix) The habitat type 6290 (*Mediterranean subnitrophilus grasslands*) cover extended areas of abandonment fields of western, central and eastern Mediterranean, found in thermo- and meso-Mediterranean zones in soils rich in nitrogen (Figure 3, right). The habitat type forms grasslands in elevation lower than

1200 m, in soils with low slopes. It forms open communities from early-successive species along roads, earth work banks and mostly between agricultural fields. Favouring by grazing, the habitat replaces oligotrophic communities of annual species of Thero - Brachypodietea. Continuous and intense grazing may result in perennial grasses of *Poetalia bulbosae* and relevant communities, while increased levels of nitrogen may lead in marginal (fallow) lands. Also, increased levels of soil humidity may result in perennial steppes of *Andropogon* or Phoenician turf grass swards. Invasion from woody plants may lead to halonitrophilous shrublands of *Salsolo-Peganetalia* or maguis or garrigues of *Rosmarinetalia*, *Lavanduletalia*, or *Gypsophiletalia*. Grasslands of this habitat type are dominated by grasses, like *Bromus*, *Aegilops*, *Avena*, *Vulpia*, Cruciferae and Papilionaceae. It has been recorded in Thrace (Filiouris river 100 m), western Macedonia (area of lakes Vegoritida-Petron 640 m), Peloponnesus (Mts Marmbas and Klokos 939 m, Kotychi lagoon 1 m, Mt Parnonas 1250 m, Mts Gerania 700 m), and in Crete (area of Fres 400 m). The type is further distinguished in the subtypes of Mediterranean subnitrophilus communities from grasses (found in abandoned fields or areas experiencing extensified livestock husbandry, and dominated by grasses like *Bromus fasciculatus*, *B. madritensis*, *B. intermedius*, *B. alopecurus*, *B. rubens*, *B. hordeaceus*, *B. tectorum*, *Aegilops neglecta*, *A. geniculata*, *A. triuncialis*, *A. ventricosa*, *Taeniatherum caput-medusae*, *Avena sterilis*, *A. barbata*, *Lagurus ovatus*, *Lolium rigidum*, *Vulpia ciliata*, *V. bromoides*, *V. geniculata*, *Lamarckia aurea*, *Trisetum paniceum*, *Cynosurus echinatus*, *Stipa capensis*, together with *Scandix australis*, *Astragalus scorpioides*, *Trifolium cherleri*, *T. hirtum*, *T. striatum*, *T. campestre*, *T. arvense*, *T. glomeratum*, *Viccia lutea*, *Medicago rigidula*, *M. sativa*, *M. littoralis*, *Melilotus sulcata*, *Coronilla scorpioides*, *Filago minima*, *Paronychia*



Fig. 2 Typical dry grasslands of northern Greece: natural grassland Natura habitat types left: 6230 - Species-rich *Nardus* grasslands, on siliceous substrates" in Varnountas mountain, right: 6290 - Mediterranean subnitrophilus grasslands in Lagkadas hills. Photos: M. Vrahnakis.

argentea, etc.) and subnitrophilus herb communities of eastern Mediterranean (formations of annual herbs found in dry areas of Aegean sea (e.g. eastern Crete), expressing the last stage of degradation of phrygana (due to overgrazing)).

The habitat types:

- 1510 (*Mediterranean salt steppes, *Limonieta*),
- 6420 (Mediterranean tall humid herb grasslands of the *Molinio-Holoschoenion*),
- 6430 (Eutrophic tall herbs),
- 6432 (Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels of the class *Betulo-Adenostyletea*),
- 6510 (Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)),
- 651A (Mesophilic meadows)

are not straightforwardly related to dry grasslands; it is rather some of their associations that are related, but this needs to be further investigated and documented.

Finally, several other vegetation types maybe included in the category of dry grasslands like Mediterranean steppes, pseudo-steppes, perennial grasslands, phrygana, open shrublands, and grasslands supported silvopastoral systems (like the valonia oak silvopastoral grasslands) ó a fact that underpins the urgent need for a more systematic study (inventory, monitoring) of dry grasslands of Greece.

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Fig. 3 Lathyrus setifolius L.: an impressive therophyte from grasslands of northern Greece. Photo: K. Vidakis.

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Miscellaneous

We are seeking one (or two) dedicated members to join us four botanists (from Slovakia, Latvia, Greece and Germany) in the Executive Committee. If YOU like to govern and develop our international network, we would much appreciate if you contact us to dis-

Announcements to the EDGG members from the Executive Committee or from the regional subgroups.

cuss details. In order to have the full breadth of the EDGG activities and interest also reflected among the chairing persons, we particularly invite applications from zoologists (and other non-botanists) and from countries not yet represented among the chairs.

Book reviews

Veen, P., Jefferson, R., de Smidt, J., van der Straaten, J. (2009) [Eds.]: Grasslands in Europe of high nature value. ó 320 pp., KNNV Publishing, Zeist, Netherlands. ISBN 978-90-5011-316-8. Price: 69.95 p.

If you are an EDGG member and wish to review a certain book or if you are an author, editor, or publisher and would like to see a title of yours be reviewed, please contact our Book Review Editor, Jürgen Dengler (dengler@botanik.uni-hamburg.de).

This handsome, hard-backed and most readable volume addresses key issues for the conservation of high nature value (HNV) grasslands in Europe at a critical time when agricultural intensification and, more insidious, abandonment of traditional pastoral systems threaten their future. Profusely illustrated and with elegant and spacious layout, it presents case studies of the conservation of biodiversity-rich grassland, many of them projects in Central and Eastern Europe initiated by the Royal Dutch Society for Nature Conservation, supported by the Government of The Netherlands. Here is a valuable overview of European grasslands, showing how rich pockets survive in Western Europe and emphasizing the international importance of more extensive stands, especially of dry grassland, in Eastern Europe.

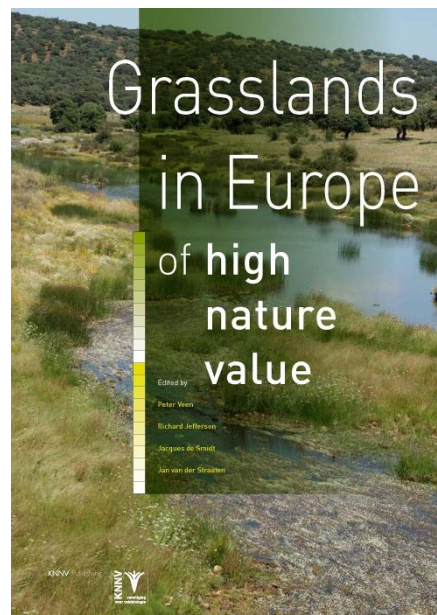
The book is in three sections. Section 1, six introductory chapters, covers the origins, development and use of grassland, grasslands as habitats for birds and butterflies, grasslands and climate, and methodology for identification of HNV grassland. Section 2, which begins with an evocative photographic section comparing project areas, has 24 chapters devoted to these national case studies. They are spread across Europe from the Mediterranean region to Scandinavia and western Ireland, from lowland to mountains, and include a wide selection of dry and wet grasslands, wooded meadows and wood-pasture, even limestone pavement, peatland and salt-steppe. Most are drawn from EU countries, but projects from Switzerland, Ukraine, Belarus and Anatolia are included. Section 3 is a chapter on EU policy outlook that seeks to involve farmers, with recommendations for future progress. The book ends with biographical sketches of the 76 contributors and a helpful glossary of geographical and pedological terms. Each chapter has a bibliography and each in the main section has location maps. All have high-quality colour photographs of landscape views and some characteristic plants and animals, especially butterflies (dry grasslands support 63% of European species), birds, amphibians and crickets.

There is much vegetation science but also a strong human element. The examples focus on aspects of

maintaining grassland biodiversity and traditional agricultural landscapes ó derived from centuries of wise husbandry and sustainable use of natural resources by farming communities ó in the face of social change and pressure to industrialize farming. Loss of pastoral tradition is a constant theme. The European Commission does recognize the environmental benefits of grassland, but it is vital that any conflict be resolved between financial incentives for conservation, such as agri-environment schemes for Natura 2000 habitats, and funds such as area payments that may encourage farming intensification.

This book will be a useful reference work for grassland specialists and other biologists, and appeal to naturalists and enthusiasts for wildlife and landscapes. Its wealth of information is the sort of evidence needed to convince funders, decision-makers and politicians of the ecological, cultural and socio-economic value of Europe's grassland biodiversity. Fortunately, many farmers and other local people already understand that such natural richness is both their heritage and future.

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e-mail: jrakeroyd@dsl.pipex.com*



Gibson, D. J. (2009): Grasses and grassland ecology. ó VIII + 305 pp., Oxford University Press, Oxford. Hardback: ISBN 978-0-19-852918-7. Price: 70,6 GBP. Paperback: ISBN: 978-0-19-852919-4. Price: 34.95 GBP.

Grasslands in the widest sense (including shrubland and tundra) occupy 31.643% of the land surface of the Earth. They are crucial for global ecology as well as for human food production. Grasslands are ó by definition ó mostly dominated by members of the Poaceae, the fourth largest vascular plant family with 7,500 species. This book aims at being a scientific introduction to both the Poaceae and to grasslands from a mainly ecological perspective.

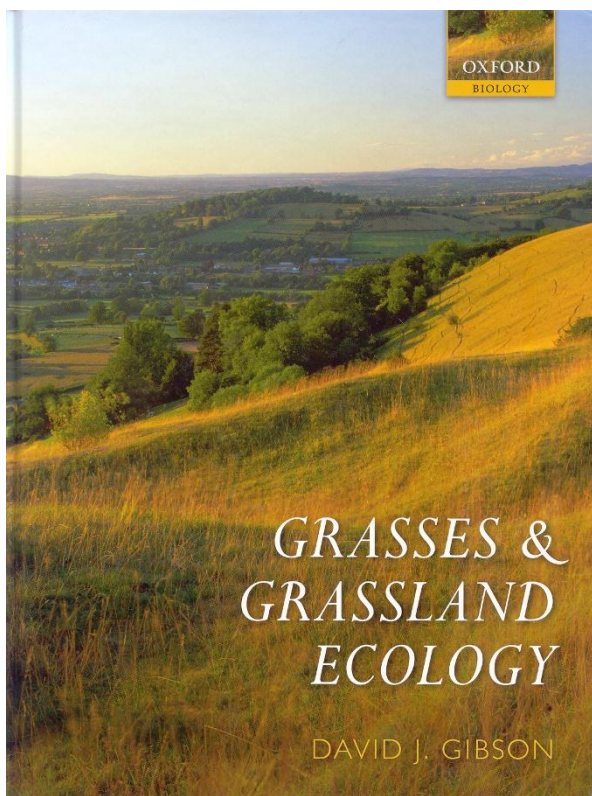
It is organised in ten chapters. The 'Introduction' provides some useful terminological definitions as well as global statistics on grassland types, grassland coverage and grassland loss. There you learn, for example, that Benin is the country with the highest proportion of grasslands (93%) and that in North America already 90% of the natural grassland ecosystems have been destroyed ('converted'). The following three chapters deal with 'Systematics and evolution', 'Ecological morphology and anatomy' and the 'Physiology' of grasses. Further three chapters, focus on ecology of grasslands on three organisational levels ('Population ecology', 'Community ecology', 'Ecosystem ecology'). Chapter 8 ('World grasslands') tries to arrange the variety of grassland types occurring all around the globe into a classification system and ends up with five coarse types: A: tropical moist climates (savannahs); B: dry climates; C: moist subtropical mid-latitude climates; D: Moist continental mid-latitude climates; H: highland climates. Additionally, three regional classifications are very briefly outlined (US National Vegetation Classification System; Europe: EUNIS; China). A nice chapter on 'Disturbance' highlights the relevance of the intermediate disturbance hypothesis (IDH) for grasslands, and demonstrates how the different factors of disturbance (fire, herbivory and drought) in different intensities and frequencies interact in shaping the diversity of grasslands. The book is concluded with a chapter on 'Management and restoration' and an extensive reference list (45 pp.).

All in all, this is an informative book. However, its claim to give a general introduction to grasses and grassland ecology is not fulfilled, as it deals nearly exclusively with North American prairie ecosystems (approx. 90% of the space is devoted to these). In particular, the particularities of the semi-natural grasslands of Europe with their long-standing co-evolution with humankind and their extraordinary conservation value (see book review of Veen et al. 2009 by J. Akeroyd in this Bulletin) is largely ne-

glected (only pp.175-179 are devoted to them). While a European ecologist will learn hardly anything relevant about European grasslands from this book and the global analyses appear to be very rough and preliminary, it is still a useful tool because it demonstrates the very different perspective of North American ecologists when they speak of grasslands, including a deviating terminology. Being aware of this fact, might help European grassland ecologists when submitting research papers to international journals and then being confronted with unexpected comments by referees or editors from the United States.

Nevertheless, it would be desirable to extend this book, which presently rather should be named 'Grasses and grassland ecology of North America', in a future edition to a globally valid compendium. Therefore, I recommend to augment the author list with competent grassland ecologists from other continents.

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Forum

The Forum section offers the possibility to our members for posing small requests or initiating discussions that might be interesting to other members as well.

World Index of Plot-Based Vegetation Databases

Formerly called the World Metadatabase on Vegetation Databases, this enterprise jointly hosted by the Section Vegetation Databases of NetPhyD, the Ecoinformatics Working Group of IAVS and the University of Greifswald now approaches the decisive steps (see <http://www.botanik.uni-greifswald.de/527.html>). Already 54 databases from all continents, containing more than 1.4 million relevés have registered (see <http://www.botanik.uni-greifswald.de/373.html>).

The metadata of these databases will be published online (continuously updated) and in an attractive book (series Biodiversity & Ecology). This publication of metadata aims at stimulating the original data from various databases for a wide variety of analyses

(large-scale classification, biodiversity patterns, conservation issues). If you do not have registered your database yet, please, do so at <http://www.botanik.uni-greifswald.de/373.html>. It takes only one minute.

All registered contact persons of vegetation databases will soon be contacted and informed how the data upload (online) for the electronic metadatabase and the printed report in Biodiversity & Ecology works. Please do not send us data or reports prior to this specific invitation.

Jürgen Dengler (dengler@botanik.uni-hamburg.de)

AVS now features papers on vegetation classification

Applied Vegetation Science (AVS, impact factor: 1.305), one of the official journals of the International Association for Vegetation Science (IAVS), our parent organisation, has recently extended its scope to explicitly cover vegetation classification and survey. They have appointed two new associate editors with expertise in this field, Professors Angelika Schwabe-Kratochwil and Joop Schaminée, but they will be supported by various long-standing editors with solid background in vegetation survey, namely Professor Milan Chytrý.

As of 2010, AVS in addition to its traditional topics (e.g. remote sensing, conservation and restoration) invites high-quality papers in vegetation classification and survey. If there is a continuous flow of good manuscripts, this will support the establishment of a permanent section on Vegetation Survey in AVS.

According to the editors, submissions are welcome on topics of general interest to AVS readers. They define this as papers that:

contain a synthetic, comparative treatment of the selected vegetation type over a large area, based on a large comprehensive data set (this is the type of paper we are especially looking for), **or**

describe vegetation which is unique for biogeographical reasons, or has an interesting ecology, and has been hardly ever described before, **or** apply a new method of data analysis, or evaluates the performance of such a method, **or** describe new applications of vegetation classification, e. g., for conservation management and other applied approaches, **or** compare vegetation classification with other approaches.

The studies should describe the methods of data sampling and formally describe each step of the classification process. Any synoptic tables should be electronic appendices, but shortened versions of the most important ones can be in the main text: normally up to one printed page, possibly two pages if there are many vegetation types or very species-rich vegetation types.

PLEASE SUBMIT YOUR BEST CLASSIFICATION PAPERS TO AVS TO MAKE THIS THE WORLD-LEADING JOURNAL IN THIS FIELD.

Jürgen Dengler (dengler@botanik.uni-hamburg.de)

Forthcoming events

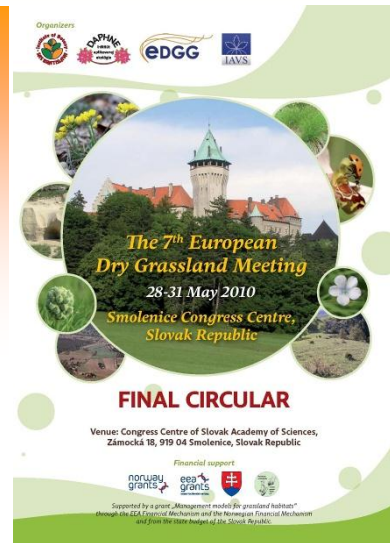
The 7th European Dry Grassland Meeting

28-31 May 2010

Smolenice, Congress Centre of Slovak Academy of Sciences, Slovak Republic

The date of our meeting is approaching. We are looking forward to meet you in Smolenice.

The final circular can be download from the EDGG homepage
EDGG [homepage: http://www.edgg.org](http://www.edgg.org)



Mountain hay meadows, hot spots of biodiversity and traditional culture

The Pogány-havas (Pagan Snow-Cap) Association invites you to participate in our conference "Mountain hay meadows, hot spots of biodiversity and traditional culture", **7-9 June 2010** in the Boros Guesthouse, Borospataka (Wine valley), **Lunca de Jos, Harghita County, Transylvania, Romania.**
<http://mountainhaymeadows.eu/conference.php>

The aims of the conference are:

- to bring together farmers, biologists, sociologists, economists, policy makers and NGOs for discussions about hay meadow conservation and sustainable management;
- to raise awareness about the conservation and social value of mountain hay meadows;
- to celebrate the International Year of Biodiversity

The themes of the conference will include:

- Creation of the agricultural landscapes of Gyimes and Csik;
- Hay meadows and their biodiversity;
- Hay meadow management in practice;
- Hill farming in a protected landscape, the Convention on Biological Diversity,
- Local attitudes to meadows: results from social surveys;
- Putting a value on traditional farming;
- Local perspective on sustainable rural development;
- Quality milk production;
- Adding value to meadow products through food and tourism.

7th SER (Society for Ecological Restoration) European Conference on Ecological Restoration

in **Avignon 23-27 August 2010**, Southern France

You can already have a look at the objectives of the conference :

<http://www.seravignon2010.org/Welcome-And-Themes/Welcome-to-the-SER-European-2010-Conference-Web-Site>

The place where it will be organised, the Pope' Palace in the Medieval City of Avignon in Southern Mediterranean France, is one of the most visited monuments to the world !

http://www.seravignon2010.org/Host_-Organising-Committee-and-Sponsors/The-International-Conference-Center-in-the-Popes%E2%80%99-Palace

Take a look at the 12 half-day excursions organized on Wednesday August 23th 2010 in the afternoon :
<http://www.seravignon2010.org/Program/Field-Trips>

Submission of proposals of contributions has closed, but registration is still open. Save money by booking before 15 May 2010 at the cheapest price.

Be sure to have your favorite excursion selected and your hotel at the cheapest price as well. So join now ! <http://www.seravignon2010.org/Venue-And-Accommodation/Registration-Fees-and-Form>

Conference homepage:
<http://www.seravignon2010.org>

Other forthcoming events

13th meeting of the FAO-ciheam sub-network on Mediterranean pastures and fodder crops

7-10 April 2010, Alicante, Spain

Registration closed

53th Symposium of the International Association for Vegetation Science (IAVS)

Changing Gradients in Vegetation and the Environment

18-23 April 2010, Ensanada, Baja California, Mexico

Registration closed

19th Workshop of the European Vegetation Survey (EVS)

Flora, Vegetation, Environment and Landuse at Large Scale

27 April ó 2 May 2010, Pécs, Hungary

Registration closed

23th Annual Conference of the Specialist Group Plant Population Biology of the GfÖ

13-15 May 2010, Nijmegen, Netherlands

Deadline for registration and abstract submission: 31 March 2010

Short Course: Using PC-ORD to Analyze Multivariate Community Data

16-18 June 2010, Slovenia

Homepage: <http://silv.cas.psu.edu/pcord.htm>

Registration closed

14th MÉTA-trip to Northern Bulgaria

24 June ó 2 July 2010, Bulgaria

Contact: Zsolt Molnar (molnar@botanika.hu)

Registration closed

Anthropization and environment of rural settlements. Flora and vegetation

29 June ó 1 July 2010, Kamyanets-Podilskiy, Ukraine

Contact: 9Anthropization_UA@ukr.net

2nd EDGG Research Expedition

10-25 July 2010, Central Podilia, Ukraine

Contact: Anna Kuzemko (anya_meadow@mail.ru) and Jürgen Dengler (dengler@botanik.uni-hamburg.de)

Deadline for registration: 15 April 2010

Details: see pp. 6-8 of this Bulletin

23rd Conference-Expedition of the Baltic Botanists

Seminal Communities

19-22 July 2010, Haapsalu, Estonia

Conference homepage: <http://www.elus.ee/balticbotany>

Contact: malle.leht@emu.ee

Deadline for abstract submission: 31 March 2010

Deadline for registration: 30 April 2010

Federation (EGF)

Grasslands in a Changing World

29 August ó 2 September 2010, Kiel, Germany

Conference homepage: www.egf2010.de

Deadline for abstract submission: 31 October 2009

Deadline for registration: 30 April 2010

40th Annual Conference of the Ecological Society of Germany, Austria and Switzerland (GfÖ)

The Future of Biodiversity - Genes, Species, Ecosystems

30 August ó 3 September 2010, Gießen, Germany

Further information: <http://www.gfoe.org/index.php?id=318&L=1>

Annual Meeting of the British Ecological Society (BES) 2010

7-9 September 2010, Leeds, United Kingdom

Further information:

http://www.britishecologicalsociety.org/meetings/current_future_meetings/2010_annual_meeting/index.php

Eurasian Steppes: Status, Threats and Adaptation to Climate Change

9-12 September 2010, Hustai National Park, Mongolia

Conference homepage: www.hustai.mn

Deadline for abstract submission: 31 March 2010

Deadline for registration: 31 March 2010

3rd Croatian Botanical Congress

24-26 September 2010, Island of Murter, Dalmatia

Deadline for abstract submission is 15 June 2010

Conference homepage: <http://www.imp-du.com/3hbok>

8th European Dry Grassland Meeting

13-17 June 2011, Uman, Ukraine

Contact: Anna Kuzemko (anya_meadow@mail.ru)

Details: see Bulletin No. 5, pp. 11-13



Vegetation of a kurgan in the Pontic herb-rich grass steppe (to contribution of . I. Moysiienko & B. Sudnik-Wójcikowska: Kurgans of Ukraine ...).

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