Towards a consistent classification of European grasslands

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Consistent vegetation classification: the need and the challenges

Plot-based classification of vegetation into a hierarchical system is an important aim of phytosociology (Braun-Blanquet 1965; Ewald 2003; Dengler et al. 2008). Phytosociological classifications traditionally started with local or regional data sets, which were then placed into a largerscale classification scheme using expert judgement. In this process, national idiosyncrasies and inconsistencies emerged. However, consistent vegetation classifications are needed for multiple purposes (Dengler et al. 2008), e.g. to define units for ecological research or conservation assessment. Specifically, habitat conservation in the European Union is closely linked to syntaxonomic units (European Commission 2007). Inconsistencies in vegetation classifications among European countries thus have direct effects on research and conservation practice.

In the past, syntheses beyond national borders were impeded by the complicated access to original relevés and by the lack of computer programs to handle such large amounts of data. Phytosociological classifications at a European scale are therefore very rare. Exceptions include Royer (1991), who classified dry grasslands of the class Festuco-Brometea in its whole Euro-Siberian range through manual comparison of synoptic tables, and Zechmeister & Mucina (1994), who presented the only plot-based numerical classification of a higher syntaxon across Europe so far (class Montio-Cardaminetea). Rodwell et al. (2002) compiled the first comprehensive overview of European vegetation classes, orders and alliances based on expert assessment, but comparative analyses based on real data that would support the concept of these units are still missing for most of them.

With the increasing availability of huge amounts of electronic vegetation-plot data from most European countries (Dengler et al. 2011), for the first time, it now seems feasible to produce consistent supra-national or even continental classifications based on comprehensive data sets. However, such attempts are still a major challenge, requiring long-term collaboration of researchers from several countries to compile joint databases. This work is impeded by the multiple plant taxonomies used, which cannot be easily resolved with online tools, but require manual matching of taxonomic concepts (Jansen & Dengler 2010).

During the last 15 years, dynamic development of methodological approaches for vegetation classification...
has occurred (e.g. BrueLheide 2000; Chytrý et al. 2002; Dengler 2003; Willner 2011), but some issues have been raised that were previously rarely considered. The questions to be addressed in any classification, but particularly those at larger spatial scale, include: (1) how can we deal with the strongly varying plot sizes between syntaxa (Chytrý & OtývkoVá 2003) and among regional traditions, considering that the determination of diagnostic species is strongly plot size-dependent (Dengler et al. 2009); (2) which confounding effects are caused by non-random and unequal sampling of regions and vegetation types and how can they be reduced (e.g. Lengyl et al. 2011); (3) how should widespread communities lacking diagnostic species be classified (e.g. Dengler 2003); and (4) how can individual studies contribute to a consistent European classification system, given that the determination of diagnostic species is always context-dependent (Willner et al. 2009)?

**European grasslands**

Grasslands are a prominent feature of the present-day vegetation of Europe, some natural (like continental steppes, alpine and some coastal grasslands), while the majority originated from long-term land use as pastures and meadows (Poschlod et al. 2009). We define grasslands in a broad sense, comprising all herbaceous vegetation types dominated by graminoids (Poaceae, Cyperaceae, Juncaceae). They host a fraction of Europe’s biodiversity that is much larger than for other habitat types with similar or bigger spatial extent (Hobohm & Bruchmann 2009; Veen et al. 2009). European semi-dry grasslands hold the world record for vascular plant species richness at grain sizes below 100 m² (Wilson et al. 2012). For these reasons and because of the strong decline of the area and quality of high nature value grasslands in recent decades (Veen et al. 2009), many grassland types are listed as priority habitats in the Habitats Directive of the European Union (European Commission 2007).

Despite their importance, we presently lack a consistent classification of European grassland types. The first broad-scale international classification based on statistical analysis of a large data set of individual vegetation plots from European grasslands was performed by Zuidhoff et al. (1995) on mesic pastures (alliance *Cynosurus cristati* of Northwest and partly also Central and South Europe. Only a few such studies have followed: basiphilous dry grassland communities of skeletal soils (*Allyso-Sedetalia*) in North compared to Central Europe (Dengler & Löbel 2006), montane sub-alpine tall forb and tall grass communities (*Melge-dio-Acorniteae*) in Central compared to North Europe (Michl et al. 2010), wet, mesic, semi-dry and dry grasslands of Central, mainly East-Central Europe (orders *Molinietalia*: Botta-Dukát et al. 2005; *Brachypodietalia pinnati*: Illyés et al. 2007; *Festucetalia valesiaceae* and related units: Dúbravková et al. 2010; *Arrhenatheretalia*: RozbrojoVá et al. 2010). However, there have been no comparable studies in East, South and West Europe.

**Contents and prospects of the Virtual Special Feature**

Eighteen papers from a broader initial pool of proposals have been invited for the VSF. These papers cover a wide range of different grassland types, from natural through semi-natural to anthropogenic, from dry to wet and from lowland to alpine. The anticipated contributions range from the Iberian Peninsula to Russia and from the Mediterranean Basin to Fennoscandia. The production of the VSF will extend over the next couple of years, allowing later contributions to build on the experiences and methodological developments of the early ones.

In this journal issue, the first article of the VSF is published, dealing with the saline grasslands in Southeast Europe (Eliaš et al. 2013). By covering ten countries (at least partly) and vegetation units from five phytosocio-logical classes, this paper is a very good example of what we consider large scale, in both geographic and syntaxonomic terms. It may serve as a prototype for subsequent VSF papers, namely in the presentation of a well-structured synoptic table (shortened in the printed version, complete in an online appendix), distribution maps for all syntaxa and translation of the numerical classification into a syntaxonomic scheme with formal names. As printing space is limited, the wise use of online appendices can enhance the value of such articles. For example, Luther-Mosebach et al. (2012) presented complete relevé tables and a detailed description of all distinguished community types with colour photographs in an appendix. Further examples of large-scale vegetation classification can be seen in other papers published in the Vegetation Survey section of Applied Vegetation Science since 2011 (Chytrý et al. 2011).

**References**


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