



# Towards a revised classification of the Pontic-Pannonian steppe grasslands

Wolfgang Willner (1), Anna Kuzemko (2), Norbert Bauer (3), Thomas Becker (4), Claudia Biță-Nicolae (5), Zoltán Botta-Dukát (6), Milan Chytrý (7), Jürgen Dengler (8), Ruzica Igić (9), Monika Janišová (10), Zygmunt Kački (11), Iryna Korotchenko (12), Mirjana Krstivojević (9), Tamás Rédei (6), Eszter Ruprecht (13), Luise Schratt-Ehrendorfer (14), Yuri Semenishchenkov (15), Zvezdana Stančić (16), Yulia Vashenyak (17) & Denis Vynokurov (12)

- 1) Vienna Institute for Nature Conservation & Analyses, Giessergasse 6/7, A-1090 Wien, Austria
- 2) National Dendrological Park "Sofiyvka" of NAS of Ukraine, Kyivska 12a, 20300 Uman', Ukraine
- 3) Dept. of Botany, Hungarian Natural History Museum, Baross u. 13, H-1088 Budapest, Hungary
- 4) Dept. of Geography and Geosciences, University of Trier, Behringstr. 21, D-54286 Trier, Germany
- 5) Institute of Biology, Romanian Academy, Splaiul Independentei 296,s.6, RO-060031 Bucharest, Romania
- 6) MTA Centre for Ecological Research, Alkotmány u. 2-4, H-2163 Vácrátót, Hungary
- 7) Dept. of Botany and Zoology, Masaryk University, Kotlářská 2, CZ-61137 Brno, Czech Republic
- 8) Disturbance Ecology, University of Bayreuth, Universitätsstr. 30, D-95447 Bayreuth, Germany
- 9) Dept. of Biology and Ecology, University of Novi Sad, Trg Dositeja Obradovića 2, 21000 Novi Sad, Serbia
- 10) Institute of Botany, Slovak Academy of Sciences, Ďumbierska 1, SK-97411 Banská Bystrica, Slovakia
- 11) Institute of Plant Biology, University of Wrocław, Kanonia 6/8, P-50-328 Wrocław, Poland
- 12) M.G. Kholodny Institute of Botany, NAS of Ukraine, Tereshchenkivska 2, 01601 Kyiv, Ukraine

**Background & Aims:** Steppe grasslands contribute a major part to the overall biodiversity of Central and Eastern Europe. However, the area of species-rich grasslands has strongly declined during the last century. A consistent supra-national classification of these habitats is urgently needed as a basis for their effective conservation and monitoring.

**Material & Methods:** We studied main phytosociological patterns within the Pontic-Pannonian steppe grasslands using a large dataset of vegetation plots covering the whole Carpathian Basin (E Austria, Moravia, Slovakia, Hungary, Romania, N Croatia and N Serbia) as well as Ukraine and adjacent regions in S Poland and SW Russia (Bryansk region). Altogether 43 706 relevés from 11 countries were gathered. Species taxonomy and nomenclature was unified according to the Euro+Med Checklist ([www.emplantbase.org](http://www.emplantbase.org)). Critical species were merged to aggregates. From this initial data set, we selected all relevés with the presence of at least one (of 143 pre-defined) diagnostic species of the target vegetation types (steppe meadows, meadow steppes and grass steppes), of rocky steppes or of Pannonian sand steppes. Thus, we included all units traditionally included or closely related to the *Festuco-Brometea* class. Relevés with a plot size <9 m<sup>2</sup> or >100 m<sup>2</sup>, and relevés with a shrub or tree layer covering >10% were excluded. To avoid bias due to oversampling of some areas, we applied a geographically stratified random resampling. The resampled data set (17 993 relevés) was classified using TWINSpan.

**Main Results & Interpretations:** The classes of the *Molinio-Arrhenatheretea*, *Nardetea*, *Festuco-Brometea* and *Koelerio-Corynephoretea* were well separated in the classification. The position of the *Festucetalia vaginatae* (Pontic-Pannonian sandy steppes) within the *Koelerio-Corynephoretea* was confirmed. The *Agrostion vinealis* (steppic meadows on intermittently wet floodplains) was grouped together with the *Deschampsion caespitosae*, while the meadow steppes classified as the *Trifolion montani* were closely related to the *Brometalia erecti*. The delimitation between the *Festucion valesiaca* and the *Stipion lessingiana* was reproduced only partly and needs further evaluation.

**Outlook:** As next step, a detailed classification of the *Brometalia erecti* (incl. the *Trifolion montani*) and the *Festucetalia valesiaca* at the association level will be elaborated.

- 
- 13) Faculty of Biology and Geology, Babeş-Bolyai University, Republicii 42, RO-400015 Cluj-Napoca, Romania
  - 14) Dept. of Botany and Biodiversity Research, University of Vienna, Rennweg 14, A-1030 Wien, Austria
  - 15) Dept. of Botany, Bryansk State University, Bezhitskaya 14, 241036 Bryansk, Russia
  - 16) Faculty of Geotechnical Engineering, University of Zagreb, Hallerova aleja 7, HR-42000 Varaždin, Croatia
  - 17) State Inspection of Environmental Protection, I. Franka 2/2, 29010 Khmelnytsky, Ukraine

Correspondence: Wolfgang Willner, [wolfgang.willner@vinca.at](mailto:wolfgang.willner@vinca.at)

---

Willner, W., Kuzemko, A., Bauer, N., Becker, T., Biță-Nicolae, C., Botta-Dukát, Z., Chytrý, M., Dengler, J., Igić, R., Janišová, M., Kački, Z., Korotchenko, I., Krstivojević, M., Rédei, T., Ruprecht, E., Schratt-Ehrendorfer, L., Semenishchenkov, Y., Stančić, Z., Vashenyak, Y. & Vynokurov, D. 2014. Towards a revised classification of the Pontic-Pannonian steppe grasslands. In: Mucina, L., Price, J.N. & Kalwij, J.M. (eds.), *Biodiversity and vegetation: patterns, processes, conservation*, p. 206. Kwongan Foundation, Perth, AU.