

## Publication

## Alterations of steppe-like grasslands in Eastern Europe : a threat to regional biodiversity hotspots

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Recent changes in agriculture (intensification or abandonment) have resulted in a critical reduction of steppe-like grasslands in Eastern Europe. These grasslands harbor an extraordinarily high diversity of plants and invertebrates, including endemics, and are considered refugia for numerous threatened open-land species. We examined species richness, and abundance, proportion of open-land, endemic and threatened vascular plants, gastropods, and diurnal and nocturnal Lepidoptera in six different vegetation types all originating from steppe-like grasslands in Transylvania, Romania. Vegetation types included extensively grazed pastures (initial stage), three seral stages of succession (early stage of abandoned grassland, abandoned grassland with shrubs, and mature forest), and two human-made grassland alterations, namely abandoned vineyards and Pinus plantations. A total of 852 species (291 vascular plants, 24 gastropods, 129 diurnal and 408 nocturnal Lepidoptera) were found in the 22 study sites. The four taxonomic groups differed in their response to the abandonment of steppe-like grassland, except that species richness of plants and diurnal Lepidoptera were positively correlated. The complementarity of species composition increased with successional age in all taxonomic groups examined. The number of characteristic open-land species decreased with successional age in plants and gastropods. All investigated vegetation types harbored threatened (red-listed) species. Endemic species were found in all vegetation types except mature forests and Pinus plantations. All Transylvanian endemics and the majority of threatened species found were open-land species. Extensively cultivated vineyards, which have been abandoned for two to three decades, also maintained high plant and invertebrate diversities, comparable to those of the corresponding stages of grassland succession. In contrast, Pinus plantations (a recent grassland alteration) have changed habitat quality and will have a devastating effect on the unique, indigenous diversity of these steppe-like grasslands as soon as the canopy closes. To prevent losses of characteristic species, we suggest a rotational grassland management program that maintains different seral stages. Succession to mature forest and additional Pinus plantations should be prevented.

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