

Conservation of Insular Semi-Natural Dry Grassland from Carpathians and Transylvania, Romania

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How to cite this paper: Sicora, O., Szatmari, P.-M., Sicora, C. and Hodor, N. (2025) Conservation of Insular Semi-Natural Dry Grassland from Carpathians and Transylvania, Romania. *Natural Resources*, 16, 795-816.
<https://doi.org/10.4236/nr.2025.1613040>

Received: January 31, 2025

Accepted: December 26, 2025

Published: December 29, 2025

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Abstract

In the last decade, it has become scientifically evident that the insular dry grasslands of the Carpathians and the Transylvanian Depression in Romania represent biodiversity hotspots. These semi-natural dry grassland habitats are traditional cultural landscapes resulting from low-intensity land-use practices over centuries. Nowadays, changes in land use, such as agricultural intensification, cessation of traditional management, long-term abandonment, and a lack of public and policy-maker awareness of their importance, constitute factors that threaten these high natural value grasslands. Consequently, their distribution has become insular and isolated. Therefore, in order to preserve these valuable grasslands, it is imperative to explore and implement effective conservation strategies. The significance of ecosystems is evident from the presence of specific motifs in Romanian folk culture that reflect the diversity of Transylvanian grasslands. Moreover, public awareness has been raised in recent years by national and international celebrities who have visited or showcased the Transylvanian grasslands in their activities. To raise public awareness about Transylvanian dry grasslands and to *ex situ* conserve them, we constructed a small dry grassland plot within the “Vasile Fati” Botanical Garden in Jibou, Romania. This project aligns with other ongoing conservation activities at the “Vasile Fati” Botanical Garden of the Biological Research Center in Jibou, including the conservation of endangered plant species and traditional Romanian fruit trees, especially apple trees, as well as educational activities in the fields of ecology, botany, and zoology.

Keywords

Dry Grasslands, Public Awareness, *Ex Situ* Conservation

1. Introduction

The territory of Romania is characterized by unity in the Carpathian Mountains and their surroundings. The Carpathians surround the hilly depression of Transylvania. In the Carpathians, forests, meadows and pastures dominate the region. There are fewer arable lands, which are more extensive in the Transylvanian Depression and in the intra-mountain areas, where many surfaces have been deforested. The distinctive feature of the Carpathians and Transylvania is the presence of forests, usually composed of the same species (*Quercus*, *Fagus*, *Betula*, *Populus*, *Picea*, *Abies*), and meadows, which are very rich in species.

Grasslands and hayfields are defined as areas with exclusively herbaceous vegetation predominantly consisting of grasses from the Poaceae, Cyperaceae, and Juncaceae families [1]-[3]. These grassland areas represent a characteristic of European vegetation resulting from specific animal husbandry activities and preserved by local communities, derived from the specific forest ecosystems of the climatic zone [4] [5]. In Transylvania and the inter-Carpathian depressions, extensive areas of grasslands can still be found, traditionally maintained and managed through late manual mowing (at the end of summer) and/or low intensity grazing. Their character becomes fragmented and highly insular. Moreover, the introduction of modern agricultural practices and the cessation of traditional management, coupled with the lack of conservation policies and awareness of the importance of these ecosystems, lead to the loss of biodiversity and ecological functionality of these communities [6] [7]. In recent decades, many lands have remained uncultivated and have been invaded by saplings [8].

The Transylvanian grasslands, characterized by their rich biodiversity and unique ecosystems, represent a vital component of the region's natural heritage and serve as crucial ecosystems that support numerous plant and animal species while providing essential ecosystem services [7] [9]. These semi-natural grasslands have evolved over millennia, shaped by environmental factors such as herbivore pressure and climatic conditions, which have fostered their resilience and ecological complexity [10]. Despite their ecological significance, these landscapes face intensifying threats from agricultural intensification and land-use changes, which reduce their extent and ecological value [11] [12]. The distinct flora and fauna of these grasslands not only contribute to local biodiversity but also play a pivotal role in carbon sequestration and nutrient cycling, underscoring their importance in combating climate change and maintaining ecological balance [8] [13] [14].

In the Transylvanian Depression from Romania, there are dry grasslands of a high natural value due to their diversity and number of plant species. Dengler *et al.* [2] found that dry grasslands from Transylvania have an extraordinarily high species diversity with some sites showing the highest number of species ever recorded. Hence, these dry grasslands have high natural value and are considered biodiversity hotspots at a global scale, many being listed as priority habitats in the Habitats Directive of the European Union [15].

While large areas of dry grasslands that are traditionally managed by low-intensity mowing or grazing are still present in Transylvania, they are threatened by modern agricultural practices changes and lack of public and policy-maker awareness of their importance. [3] [4] [16] [17]. Transylvanian's grasslands exemplify the need for targeted strategies that acknowledge the nuanced interplay of ecological dynamics. The region's nutrient-poor grasslands, recognized as biodiversity hotspots [2], harbor numerous endemic species that face threats from both abandonment and non-sustainable agricultural practices. Current strategies emphasize the importance of maintaining traditional farming methods to preserve these habitats, allowing for a diverse array of flora and fauna to thrive [18]. While reforestation initiatives are prominent on the global stage, they can inadvertently threaten these unique grassland ecosystems, which have persisted for thousands of years due to factors like historical grazing and fire regimes [19]. Hence, a balanced approach is crucial; one that fosters ecological resilience while safeguarding the unique biodiversity found within Transylvania's grasslands [20]. Implementing these strategies holds the potential to mitigate biodiversity loss while enhancing community engagement in conservation efforts.

Community involvement plays a pivotal role in the conservation of Transylvanian grasslands, fostering a collaborative approach to ecological preservation [21]. Local inhabitants, often possessing deep-rooted knowledge of their environment, are essential in implementing sustainable practices that protect biodiversity. Community-led initiatives can align agricultural activities with conservation goals, thereby enhancing High Nature Value (HNV) farmland, which has been shown to support diverse species and ecosystems [22]. Empowering local populations to participate actively in conservation efforts ensures that the preservation of these vital grasslands is both effective and culturally relevant and will lead to sustainable development within the Carpathians [23]. Furthermore, projects such as the Carpathian Biodiversity Information System (CBIS) underscore the importance of grassroots engagement in monitoring and managing regional biodiversity. Also, the RGD—Romanian Grassland Database is a collection of available “relevees” from grasslands and other open habitats that are available for scientist nationally and internationally through EVA (European Vegetation Archive) and the global databases Plot that contributes to research in ecology, macroecology and conservation [24].

The paper presents the conservation efforts for these Transylvanian grasslands and describes one conservation initiatives from “Vasile Fati” Botanical Garden Jibou and public engagement by raising the awareness of the visiting public and on local policy-makers towards the importance of dry grasslands from Carpathians and Transylvania.

2. Materials and Methods

Research methods included a literature review on Carpathian and Transylvanian grasslands. Documentation regarding the cultural, economic, social and political

context of the region was assessed.

To document the richness of the spot grassland within “Vasile Fati” Botanical Garden Jibou, the relevees techniques were applied, assessing the number of species on several 2×2 m plots. Two zones were investigated for the floristic composition. The plots were situated in Jibou Botanical Garden, on the second terrace of Someș River, in NV Romania, at an altitude of 272 m above sea level with a southern orientation. The climatic conditions are characteristic for a continental climate with warm summers, cold winters and moderate precipitations (600 - 100 mm). Within the relevees, all species were identified on the spot or in the laboratory, counted and the abundance indices were calculated.

For public awareness on the importance of semi-dry grasslands, 150 printed advertising flyers were produced with relevant and short information about grasslands. These flyers were handed free of charge to the visitors together with the entrance ticket. On the model plot, an informative panel was placed with the information about the importance of grasslands designed in a friendly and easy-to-read way. Moreover, the model plot was included in the botanical garden’s guided tours in order to maximize the visibility toward the visitors of this model plot.

3. Results and Discussion

Traditional semi-natural dry grasslands are valuable ecological habitats that are still present in the intra-Carpathian and Transylvania region but they are in danger due to changes in agricultural habits. Here we made an analysis of the Transylvanian grasslands presenting the actual conservation efforts, the grasslands as cultural heritage symbols and an example of good practice from “Vasile Fati” Botanical Garden Jibou, a botanical garden from Transylvania.

3.1. Conservation Efforts for Intra-Carpathian and Transylvanian Grasslands

Grasslands in Transylvania are a unique blend of natural wealth and human heritage. Their conservation is essential not only for biodiversity but also for maintaining the region’s cultural identity and ecological balance. Sustainable management practices, supported by local and international initiatives, are key to ensuring their future [6].

The conservation strategies aim towards:

3.1.1. Agri-Environment Schemes and Financial Incentives

The European Union’s Common Agricultural Policy (CAP) provides financial support to farmers who adopt environmentally friendly practices. These subsidies encourage traditional grazing and mowing regimes, avoiding the use of chemical fertilizers and pesticides and maintaining biodiversity-rich habitats like flower-rich meadows and hedgerows [25].

Local NGOs in Transylvania are working to improve access to these schemes, ensuring that small-scale farmers can benefit from them.

3.1.2. Restoration of Abandoned Grasslands

The activities for restoration of abandoned grasslands are:

- *Manual clearing*—conservation projects often involve removing shrubs and trees that have encroached on abandoned grasslands, restoring open habitats.
- *Reintroduction of Grazing*—controlled grazing by cattle, sheep, or traditional breeds (such as water buffalo) is being reintroduced to mimic historical practices. The careful selection of livestock density ensures that grazing remains sustainable and beneficial for biodiversity.
- *Seed Banks and Native Plant Reintroduction*—in areas where native vegetation has been lost, seed banks and reintroduction programs help restore plant communities. These initiatives often focus on rare or endemic species.

3.1.3. Community Engagement and Education

- *Public awareness campaigns* highlight the ecological, cultural, and economic value of grasslands. By promoting eco-tourism and traditional products (e.g., wildflower honey, artisan cheese), local communities are incentivized to preserve these landscapes.
- *Education programs* in schools and community workshops teach sustainable farming practices and the importance of biodiversity.
- *Festivals* celebrating traditional hay meadows (e.g., haymaking competitions) are growing in popularity, fostering pride in rural heritage.

3.1.4. Scientific Research and Monitoring

- Long-term studies are underway to monitor the health of Transylvanian grasslands and assess the effectiveness of conservation measures [26]. Research focuses on: mapping biodiversity hotspots, studying the impacts of climate change on grassland ecosystems and identifying key indicator species to track ecosystem health.
- Data collected is used to refine management strategies and prioritize areas for intervention.

3.1.5. Promotion of Ecotourism

Ecotourism initiatives aim to provide sustainable economic alternatives to farming while showcasing the region's natural beauty [27] [28]. Activities include:

- Guided nature walks to observe wildflowers, butterflies, and traditional haymaking.
- Accommodation in eco-friendly rural guesthouses that support local economies.
- Collaboration with local farmers to offer authentic cultural experiences, such as participating in seasonal grazing or mowing.

King Charles III of Great Britain and Northern Ireland has played a significant role in popularizing the grasslands of Transylvania, for more than two decades by numerous visits in the area. Due to his notoriety, this information reached the mass-media, leading to intense promotion of Transylvania's natural and cultural heritage, followed by a significant increase in the number of tourists.

3.1.6. Legislation and Protected Areas

Many grasslands in Transylvania fall within protected areas, such as Natura 2000 sites, which are part of the EU's conservation network. These designations help safeguard habitats by restricting harmful activities and enforcing sustainable land use [13]-[15].

Local and national governments are implementing stricter zoning laws to prevent urban sprawl and infrastructure projects from encroaching on grasslands.

There are scientific papers that document and recommend designation of protected areas where there are valuable islands of grasslands [1] [29]-[31].

3.1.7. Partnership with NGOs and International Organizations

- Organizations like the World Wildlife Fund (WWF) and the European Forum on Nature Conservation and Pastoralism (EFNCP) are actively involved in Transylvania, working with local stakeholders to implement conservation projects.
- Cross-border collaborations are focusing on shared ecosystems like the Carpathian Mountain grasslands, ensuring that efforts align across national boundaries.

ADEPT Foundation is a good practice example of an ONG that has an innovative approach towards the local communities from the Transylvanian Saxon villages and succeeded to reunite social and economic benefits with nature conservation through community-oriented projects.

3.1.8. Climate Adaptation Strategies

Grassland conservation plans increasingly incorporate climate change mitigation and adaptation [6] [32]. This includes:

- Identifying and protecting climate-resilient areas.
- Diversifying plant species in restored grasslands to improve resilience to extreme weather.
- Promoting grazing systems that reduce carbon footprints while enhancing soil carbon sequestration.

3.2. Grassland Cultural Heritage

Transylvanian grasslands are not just ecological treasures but also cultural landscapes [33]. They reflect centuries of harmonious interaction between humans and nature. Many local festivals, traditions, and artisanal products (like cheese and honey) are tied to these grassland ecosystems.

There are ONGs that promote this cultural heritage that is strongly bound to grasslands. These ONGs are working with local communities, universities and government to solve local economic and social problems as well as fostering a collaborative approach to ecological preservation. Involving local inhabitants that have a deep knowledge of their environment is essential for successful implementation of sustainable practices that protect biodiversity and finally lead to enhanced high natural value (HNV) farmland that supports diverse species and eco-

systems.

Observing the great diversity of species in the grass meadows, the royal botanist Dr. John Akeroyd was deeply impressed by them, as, according to his statement, they “can no longer be found anywhere else in Europe” [34].

For this reason, he created the album *The Transylvania Florilegium*, prefaced by His Royal Highness, then the Prince of Wales, now King Charles III, and published by Addison Publications. The album, featuring works by 36 artists from various countries created over seven years, contains 124 plates and was sold at the price of £11,000 per book. Additionally, he organized the conference “*Romania, a Unique Botanical Paradise*”, presented by Dr. John Akeroyd [34].

Thanks to these natural riches—plants, flowers, and the multicolored landscape—the creative spirit of the local population has developed greatly. Some foreign artists have also depicted valuable aspects of Transylvania and the Carpathians in their works. It is worth mentioning the floral motifs and flowers that adorn pieces of traditional folk costumes (especially the Romanian blouse—ia), home decorations (pillows, carpets, towels, paintings, old wooden and ceramic tableware), the groom’s flag and the bride’s wreath, wooden carvings on churches and wooden gates, glass icons, painted Easter eggs, and famous paintings (“The Ox Cart” by N. Grigorescu, “Resting Mowers” by C. Ressu, “Composition with Romanian Motifs” by I. Teodorescu, “La Blouse Roumaine” by Henri Matisse). Additionally, the Bihor sheepskin coat, adopted by Dior and many other fashion houses, appears in Romanian and international books and albums (artistic photographs from Miya Kosey’s albums—Japan), as well as in geographical, ethnographic, and tourist atlases.

Even the first names of boys and girls are inspired by flower names, as are the wreaths of girls during the Sânzieni (*Galium verum*) Festival (24 June). Romanian motifs also appear in the attire of Hollywood stars and other celebrities, as well as in folk and literary poetry and folk songs.

3.3. Conservation and Public Awareness Efforts at “Vasile Fati” Botanical Garden of Biological Research Center Jibou

3.3.1. Conservation of Grasslands

On the premises of “Vasile Fati” Botanical Garden there are islands of grassland that have a high floristic diversity as the original grasslands. These small areas of grasslands have been preserved inside the botanical garden as they originated from an initial extended grassland that had disappeared due to the construction of the actual botanical garden and they survived in time due to late summer mowing. Aware of the ecological value of these small plots of grassland, the Botanical Garden’s botanists studied the floristic composition and documented its floristic richness.

Two grassland areas from the botanical garden have been assessed.

The first area is very species-rich and much more varied due to the calcareous substrate with gypsum formations and less mowing. At the same time, they are reminiscent of the former meadows, which have been preserved thanks to their

inclusion in the botanical garden. No fewer than 302 species have been identified here.

Dominant species include: *Agrostis capillaris*, *Brachypodium pinnatum* and *Bromus erectus*, species characteristic of mesophilic and xero-mesophilic grasslands. Alongside these grasses also predominate: *Arrhenatherum elatius*, *Trisetum flavescens*, *Poa pratensis* and *Botriochloa ischaemum*, the latter suggesting anthropogenic changes in smaller areas.

The very good state of conservation of these grasslands is evidenced by the preservation of numerous geophytes (*Ornithogalum pyramidale*, *Leopoldia comosa*, *Anthericum ramosum*, *Colchicum autumnale*, *Ornithogalum orthophyllum* subsp. *kochii*, etc.), as well as by the presence of typical species that disappear as a result of grazing or other anthropogenic activities (*Aster amellus*, *Polygala major*, *Linum flavum*, *Carex humilis*, *Cruciata pedemontana*, *Centaurea oxylepis*, *Chamaecytisus albus*, *Galium glaucum*, *Lathyrus aphaca*, *Veronica prostrata*, etc.). These include species with declining populations in Transylvania (*Asyneuma canescens*, *Linum tenuifolium*, *Leontodon saxatilis*, *Ornithogalum pyramidale*, *Campanula bononiensis*, *Campanula sibirica*, *Echium italicum*, *Knautia arvensis* subsp. *rosea*, *Odontites luteus*, *Onobrychis arenaria*, *Orobanche reticulata* subsp. *pallidiflora*, *Ranunculus strigosus*, *Trifolium rubens*) and especially the endemic species of the Transylvanian meadows—*Cephalaria radiata*, which is found here at its northern limit. *Cephalaria radiata* is mentioned as rare in the red list of Oltean et al. (1994) [35], as well as being a Natura 2000 priority species [36]. During the surveys carried out in 2024, a new population of one of the rarest orchids in Romania, *Ophrys apifera*, was highlighted here. The species have only 26 populations in Romania, of which, the last four were recently discovered in the county of Sălaj [37]. It is included in all the red lists in Romania, and labeled as rare (R) [35], critically endangered (CR) [38] and endangered (E) [39]. Other species on the red list include: *Myosotis discolor* [35] [38] and *Rumex thyrsiflorus* [35] [38] and the endemic Pannonian species *Dianthus pontederiae* [38] (Table 1).

Table 1. Species abundance/dominance from the first grassland area, in alphabetical order.

Species	Abundance-Dominance—from + (one or a few specimens) to 5 (dominant species)
<i>Achillea collina</i> (Becker ex Rchb.f.) Heimerl	2
<i>Achillea setacea</i> Waldst. & Kit.	1
<i>Agrimonia eupatoria</i> L.	+
<i>Agrostis capillaris</i> L.	4
<i>Agrostis stolonifera</i> L.	1
<i>Ajuga genevensis</i> L.	+
<i>Allium scorodoprasum</i> L.	+
<i>Allium vineale</i> L.	+

Continued

<i>Alopecurus pratensis</i> L.	1
<i>Anthericum ramosum</i> L.	+
<i>Anthoxanthum odoratum</i> L.	+
<i>Anthriscus sylvestris</i> (L.) Hoffm.	+
<i>Arabidopsis arenosa</i> (L.) Lawalrée	+
<i>Arabidopsis thaliana</i> (L.) Heynh.	+
<i>Arabis hirsuta</i> (L.) Scop.	+
<i>Arctium lappa</i> L.	+
<i>Arctium minus</i> (Hill) Bernh.	+
<i>Arctium tomentosum</i> Mill.	+
<i>Arenaria serpyllifolia</i> L.	+
<i>Arrhenatherum elatius</i> (L.) P.Beauv. ex J.Presl & C.Presl.	3
<i>Artemisia absinthium</i> L.	+
<i>Artemisia vulgaris</i> L.	+
<i>Asparagus officinalis</i> L.	+
<i>Asperula cynanchica</i> L.	2
<i>Aster amellus</i> L.	2
<i>Astragalus cicer</i> L.	+
<i>Astragalus glycyphyllos</i> L.	+
<i>Asyneuma canescens</i> (Waldst. & Kit.) Griseb. & Schenk	+
<i>Avenula pubescens</i> (Huds.) Dumort.	+
<i>Berteroa incana</i> (L.) DC.	+
<i>Betonica officinalis</i> L.	+
<i>Bothriochloa ischaemum</i> (L.) Keng	3
<i>Brachypodium pinnatum</i> (L.) P.Beauv.	4
<i>Brachypodium sylvaticum</i> (Huds.) P.Beauv.	1
<i>Briza media</i> L.	+
<i>Bromus arvensis</i> L.	+
<i>Bromus erectus</i> Huds.	4
<i>Bromus hordeaceus</i> L.	+
<i>Bromus inermis</i> Leyss.	+
<i>Calamagrostis epigejos</i> (L.) Roth	2
<i>Campanula bononiensis</i> L.	+
<i>Campanula glomerata</i> L.	+
<i>Campanula patula</i> L.	+
<i>Campanula sibirica</i> L.	+

Continued

<i>Capsella bursa-pastoris</i> (L.) Medik.	+
<i>Cardamine hirsuta</i> L.	+
<i>Carex caryophylla</i> Latourr.	+
<i>Carex hirta</i> L.	1
<i>Carex humilis</i> Leyss.	+
<i>Carex leporina</i> L.	+
<i>Carex michelii</i> Host	+
<i>Carex montana</i> L.	+
<i>Carex pallescens</i> L.	+
<i>Carex praecox</i> Schreb.	+
<i>Carex tomentosa</i> L.	+
<i>Carlina biebersteinii</i> subsp. <i>brevibracteata</i> (Andrae) K. Werner	+
<i>Carlina vulgaris</i> L.	+
<i>Centaurea jacea</i> L.	+
<i>Centaurea jacea</i> subsp. <i>angustifolia</i> (DC.)	+
<i>Centaurea oxylepis</i> (Wimm. & Grab.) Hayek	1
<i>Centaurea phrygia</i> subsp. <i>indurata</i> (Janka) Stoj. & Acht.	+
<i>Centaurea scabiosa</i> L.	1
<i>Centaurea stoebe</i> subsp. <i>australis</i> (Pančić ex A. Kern.) Greuter	+
<i>Centaureum erythraea</i> Rafn	+
<i>Cephalaria radiata</i> Griseb. & Sohenk	+
<i>Cerastium holosteoides</i> Fries	+
<i>Cerintho minor</i> L.	+
<i>Chaerophyllum aromaticum</i> L.	+
<i>Chamaecytisus albus</i> (Hacq.) Rothm.	+
<i>Cichorium intybus</i> L.	1
<i>Cirsium arvense</i> (L.) Scop.	+
<i>Clematis vitalba</i> L.	+
<i>Clinopodium acinos</i> (L.) Kuntze	+
<i>Clinopodium vulgare</i> L.	2
<i>Colchicum autumnale</i> L.	+
<i>Convolvulus arvensis</i> L.	+
<i>Cota tinctoria</i> (L.) J. Gay	+
<i>Crepis biennis</i> Lapeyr.	+
<i>Crepis foetida</i> subsp. <i>rhoeadifolia</i> (M. Bieb.) Čelak.	+
<i>Crepis tectorum</i> L.	+

Continued

<i>Cruciata laevipes</i> Opiz	+
<i>Cruciata pedemontana</i> (Bellardi) Ehrend.	+
<i>Cuscuta campestris</i> Yunck.	+
<i>Cuscuta epithymum</i> (L.) L.	+
<i>Cuscuta epithymum</i> var. <i>trifolii</i> (Bab.) Trab.	+
<i>Cynodon dactylon</i> (L.) Pers.	1
<i>Cytisus nigricans</i> L.	+
<i>Dactylis glomerata</i> L.	2
<i>Daucus carota</i> L.	1
<i>Dianthus armeria</i> L.	+
<i>Dianthus pontederiae</i> A. Kerner	+
<i>Dorycnium pentaphyllum</i> subsp. <i>herbaceum</i> (Vill.) Rouy	3
<i>Echium italicum</i> L.	+
<i>Echium vulgare</i> L.	+
<i>Elymus repens</i> (L.) Gould	2
<i>Epilobium tetragonum</i> subsp. <i>lamyi</i> (F.W.Schultz) Nyman	+
<i>Erigeron annuus</i> (L.) Pers.	+
<i>Erigeron strigosus</i> Muhl. ex Willd.	+
<i>Erophila verna</i> (L.) DC.	+
<i>Eryngium campestre</i> L.	1
<i>Eryngium planum</i> L.	+
<i>Eupatorium cannabinum</i> L.	+
<i>Euphorbia cyparissias</i> L.	+
<i>Euphorbia esula</i> L.	+
<i>Euphorbia platyphyllos</i> L.	+
<i>Euphorbia salicifolia</i> Host	+
<i>Euphorbia stricta</i> L.	+
<i>Euphorbia virgata</i> Waldst. & Kit.	+
<i>Euphrasia stricta</i> D.Wolff	+
<i>Falcaria vulgaris</i> Bernh.	+
<i>Fallopia convolvulus</i> (L.) Á.Löve	+
<i>Fallopia dumetorum</i> (L.) Holub	+
<i>Festuca rupicola</i> Heuff.	1
<i>Festuca valesiaca</i> Schleich. ex Gaudin	1
<i>Filago germanica</i> (L.) Huds.	+
<i>Filipendula vulgaris</i> Moench	2

Continued

<i>Fragaria viridis</i> Weston	1
<i>Galium glaucum</i> L.	+
<i>Galium mollugo</i> L.	+
<i>Galium verum</i> L.	+
<i>Genista tinctoria</i> L.	+
<i>Geranium sanguineum</i> L.	+
<i>Geum urbanum</i> L.	+
<i>Glechoma hederacea</i> L.	+
<i>Helianthemum nummularium</i> subsp. <i>obscurum</i> (Celak.) J. Holub	+
<i>Heracleum sphondylium</i> L.	+
<i>Hieracium sabaudum</i> L.	+
<i>Hieracium umbellatum</i> L.	+
<i>Holcus lanatus</i> L.	+
<i>Holosteum umbellatum</i> L.	+
<i>Hypericum perforatum</i> L.	1
<i>Jacobaea erucifolia</i> (L.) P.Gaertn., B.Mey. & Schreb.	+
<i>Jacobaea vulgaris</i> Gaertn.	+
<i>Knautia arvensis</i> (L.) Coult.	2
<i>Knautia arvensis</i> subsp. <i>rosea</i> (Baumg.) Soó	+
<i>Lactuca serriola</i> L.	+
<i>Lamium album</i> L.	+
<i>Lathyrus aphaca</i> L.	+
<i>Lathyrus hirsutus</i> L.	+
<i>Lathyrus niger</i> (L.) Bernh.	+
<i>Lathyrus nissolia</i> L.	+
<i>Lathyrus pratensis</i> L.	+
<i>Lathyrus tuberosus</i> L.	+
<i>Leontodon crispus</i> Vill.	+
<i>Leontodon hispidus</i> L.	+
<i>Leontodon saxatilis</i> Lam.	+
<i>Leonurus quinquelobatus</i> Gilib.	+
<i>Leopoldia comosa</i> (L.) Parl.	+
<i>Lepidium campestre</i> (L.) R.Br.	+
<i>Lepidium draba</i> L.	+
<i>Leucanthemum vulgare</i> (Vaill.) Lam.	+
<i>Linaria vulgaris</i> Mill.	+

Continued

<i>Linum catharticum</i> L.	+
<i>Linum flavum</i> L.	+
<i>Linum tenuifolium</i> L.	+
<i>Lithospermum officinale</i> L.	+
<i>Lolium perenne</i> L.	+
<i>Lolium pratense</i> (Huds.) Darbysh.	+
<i>Lotus corniculatus</i> L.	1
<i>Luzula campestris</i> (L.) DC.	+
<i>Malva thuringiaca</i> (L.) Vis.	+
<i>Medicago falcata</i> L.	1
<i>Medicago lupulina</i> L.	+
<i>Medicago sativa</i> L.	+
<i>Medicago sativa</i> subsp. <i>varia</i> (Martyn) Arcang.	+
<i>Melampyrum arvense</i> L.	+
<i>Melilotus albus</i> Medik.	+
<i>Melilotus officinalis</i> (L.) Pall.	+
<i>Mentha arvensis</i> L.	+
<i>Mentha longifolia</i> (L.) L.	+
<i>Myosotis arvensis</i> (L.) Hill	+
<i>Myosotis discolor</i> Pers.	+
<i>Myosotis ramosissima</i> Rochel	+
<i>Odontites luteus</i> (L.) Clairv.	+
<i>Odontites vulgaris</i> Moench	+
<i>Onobrychis arenaria</i> (Kit.) DC.	+
<i>Onobrychis viciifolia</i> Scop.	+
<i>Ophrys apifera</i> Huds.	+
<i>Origanum vulgare</i> L.	2
<i>Ornithogalum orthophyllum</i> subsp. <i>kochii</i> (Parl.) Zahar.	+
<i>Ornithogalum pyramidale</i> L.	+
<i>Orobanche reticulata</i> subsp. <i>pallidiflora</i> (Wimm. & Grab.) Hayek	+
<i>Pastinaca sativa</i> L.	3
<i>Pentanema britannicum</i> (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.	1
<i>Pentanema conyzae</i> (Griess.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.	+
<i>Pentanema ensifolium</i> (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.	2

Continued

<i>Pentanema salicinum</i> (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.	+
<i>Petrorhagia prolifera</i> (L.) P.W.Ball & Heywood	+
<i>Peucedanum carvifolia</i> Vill.	+
<i>Peucedanum cervaria</i> (L.) Cusson ex Lapeyr.	+
<i>Phleum phleoides</i> (L.) H.Karst.	+
<i>Phleum pratense</i> L.	1
<i>Picris hieracioides</i> Sibth. & Sm.	+
<i>Picris hieracioides</i> subsp. <i>spinulosa</i> (Guss.) Arcang.	+
<i>Pilosella officinarum</i> Vaill.	+
<i>Pilosella piloselloides</i> (Vill.) Soják	+
<i>Pilosella piloselloides</i> subsp. <i>bauhinii</i> (Schult.) S.Bräut. & Greuter	+
<i>Pimpinella saxifraga</i> L.	+
<i>Plantago lanceolata</i> L.	1
<i>Plantago major</i> L.	+
<i>Plantago media</i> L.	+
<i>Poa bulbosa</i> L.	+
<i>Poa compressa</i> L.	+
<i>Poa pratensis</i> L.	3
<i>Polygala major</i> Jacq.	2
<i>Potentilla argentea</i> L.	+
<i>Potentilla argentea</i> subsp. <i>impolita</i> (Wahlenb.) Arcang	+
<i>Potentilla heptaphylla</i> L.	+
<i>Potentilla incana</i> P.Gaertn., B.Mey. & Scherb.	+
<i>Potentilla recta</i> L.	+
<i>Potentilla reptans</i> L.	+
<i>Potentilla thuringiaca</i> Bernh.	+
<i>Prunella laciniata</i> (L.) L.	+
<i>Prunella vulgaris</i> L.	+
<i>Ranunculus acris</i> L.	+
<i>Ranunculus bulbosus</i> L.	+
<i>Ranunculus polyanthemos</i> subsp. <i>polyanthomoides</i> Ahlfr.	+
<i>Ranunculus repens</i> L.	+
<i>Ranunculus strigosus</i> Schur	+
<i>Rhinanthus rumelicus</i> Velen.	+
<i>Rorippa austriaca</i> (Crantz) Spach	+

Continued

<i>Rorippa sylvestris</i> (L.) Besser	+
<i>Rosa gallica</i> L.	+
<i>Rubus caesius</i> L.	1
<i>Rumex acetosa</i> L.	+
<i>Rumex acetosella</i> L.	+
<i>Rumex crispus</i> L.	+
<i>Rumex obtusifolius</i> L.	+
<i>Rumex thyrsiflorus</i> Fingerh.	+
<i>Salvia glutinosa</i> L.	+
<i>Salvia nemorosa</i> L.	+
<i>Salvia pratensis</i> L.	+
<i>Salvia verticillata</i> L.	1
<i>Sanguisorba minor</i> Scop.	+
<i>Saponaria officinalis</i> L.	+
<i>Scabiosa ochroleuca</i> L.	+
<i>Scorzoneroideis autumnalis</i> (L.) Moench	+
<i>Scrophularia nodosa</i> L.	+
<i>Securigera varia</i> (L.) Lassen	+
<i>Sedum sexangulare</i> L.	+
<i>Seseli annuum</i> L.	+
<i>Seseli libanotis</i> (L.) W.D.J.Koch	+
<i>Silene flos-cuculi</i> (L.) Greuter & Burdet	+
<i>Silene latifolia</i> subsp. <i>alba</i> (Mill.) Greuter & Burdet	+
<i>Silene nutans</i> L.	+
<i>Silene viscaria</i> (L.) Jess.	+
<i>Silene vulgaris</i> (Moench) Garcke	+
<i>Solidago virgaurea</i> L.	+
<i>Stachys germanica</i> L.	+
<i>Stachys recta</i> L.	+
<i>Stellaria graminea</i> L.	+
<i>Tanacetum vulgare</i> L.	+
<i>Taraxacum officinale</i> (L.) Weber ex F.H.Wigg.	+
<i>Teucrium chamaedrys</i> L.	2
<i>Thalictrum minus</i> L.	+
<i>Thinopyrum intermedium</i> (Host) Barkworth & D.R.Dewey	1
<i>Thlaspi arvense</i> L.	+

Continued

<i>Thlaspi perfoliatum</i> L.	+
<i>Thymus glabrescens</i> Willd.	2
<i>Thymus pannonicus</i> All.	2
<i>Thymus pannonicus</i> subsp. <i>auctus</i> (Lyka) Soó	+
<i>Torilis arvensis</i> (Huds.) Link	+
<i>Torilis japonica</i> (Houtt.) DC.	+
<i>Tragopogon dubius</i> Scop.	+
<i>Tragopogon orientalis</i> L.	+
<i>Trifolium alpestre</i> L.	+
<i>Trifolium campestre</i> Schreb.	+
<i>Trifolium dubium</i> Sibth.	+
<i>Trifolium fragiferum</i> L.	+
<i>Trifolium medium</i> L.	1
<i>Trifolium pratense</i> L.	1
<i>Trifolium repens</i> L.	1
<i>Trifolium rubens</i> L.	+
<i>Trisetum flavescens</i> (L.) P.Beauv.	3
<i>Valerianella locusta</i> (L.) Laterr.	+
<i>Verbascum blattaria</i> L.	+
<i>Verbascum chaixii</i> subsp. <i>austriacum</i> (Schott ex Roem. & Schult.) Hayek	+
<i>Verbascum nigrum</i> L.	+
<i>Verbascum nigrum</i> subsp. <i>abietinum</i> (Borbás) I.K.Ferguson	+
<i>Verbena officinalis</i> L.	+
<i>Veronica arvensis</i> L.	+
<i>Veronica austriaca</i> L.	+
<i>Veronica chamaedrys</i> L.	+
<i>Veronica prostrata</i> L.	+
<i>Veronica serpyllifolia</i> L.	+
<i>Veronica spicata</i> L.	+
<i>Veronica spicata</i> subsp. <i>orchidea</i> (Crantz) Hayek	+
<i>Veronica teucrium</i> L.	+
<i>Vicia cassubica</i> L.	+
<i>Vicia cracca</i> L.	+
<i>Vicia grandiflora</i> Scop.	+
<i>Vicia hirsuta</i> (L.) Gray	+
<i>Vicia sativa</i> subsp. <i>nigra</i> (L.) Ehrh.	+

Continued

<i>Vicia sepium</i> L.	+
<i>Vicia tenuifolia</i> Roth	+
<i>Vicia tetrasperma</i> (L.) Schreb.	+
<i>Vincetoxicum hirundinaria</i> Medik.	+
<i>Viola arvensis</i> Murray	+
<i>Viola collina</i> Besser	+
<i>Viola hirta</i> L.	+
<i>Viola suavis</i> M. Bieb.	+
<i>Vulpia myuros</i> (L.) C.C.Gmel.	+

The second area is dominated by herbaceous plants such as *Poa pratensis* and *Festuca pratensis*, *Dactylis glomerata*, *Arrhenatherum elatius* together with *Alopecurus pratensis*. The identified species are listed in **Table 2**.

Table 2. Species abundance/dominance from the second grassland area, in alphabetical order.

Species	Abundance-Dominance—from + (one or a few specimens) to 5 (dominant species)
<i>Achillea millefolium</i>	3
<i>Ajuga reptans</i>	2
<i>Allium scorodoprasum</i>	+
<i>Alopecurus pratensis</i>	5
<i>Arrhenatherum elatius</i> (L.) P. Beauv. ex J. Presl & C. Presl.	5
<i>Artemisia vulgaris</i> L.	+
<i>Cardamine hirsuta</i>	+
<i>Carex hirta</i>	4
<i>Cerastium brachypetalum</i>	2
<i>Cerastium glomeratum</i>	1
<i>Cerastium semidecandrum</i>	2
<i>Cichorium intybus</i>	+
<i>Cirsium arvense</i>	+
<i>Clinopodium vulgare</i>	+
<i>Convolvulus arvensis</i>	+
<i>Corydalis cava</i>	1
<i>Crepis biennis</i>	+
<i>Cruciata laevipes</i>	+
<i>Dactylis glomerata</i>	5

Continued

<i>Daucus carota</i>	+
<i>Elymus repens</i>	+
<i>Erigeron annuus</i>	+
<i>Euphorbia esula</i>	+
<i>Fallopia japonica</i>	+
<i>Festuca pratensis</i>	5
<i>Fragaria vesca</i>	2
<i>Galium mollugo</i>	+
<i>Glechoma hederacea</i>	+
<i>Lamium purpureum</i>	+
<i>Lathyrus tuberosus</i>	3
<i>Lotus corniculatus</i>	+
<i>Lysimachia nummularia</i>	+
<i>Medicago lupulina</i>	+
<i>Medicago sativa</i>	3
<i>Mentha longifolia</i>	3
<i>Myosotis arvensis</i>	+
<i>Pastinaca sativa</i>	+
<i>Poa pratensis</i>	5
<i>Potentilla reptans</i>	+
<i>Plantago lanceolata</i>	3
<i>Plantago media</i>	1
<i>Ranunculus acris</i>	3
<i>Ranunculus ficaria</i>	2
<i>Ranunculus repens</i>	3
<i>Rorippa sylvestris</i>	+
<i>Rubus caesius</i>	+
<i>Rumex acetosa</i>	2
<i>Saponaria officinalis</i>	2
<i>Scrophularia nodosa</i>	+
<i>Scrophularia scopolii</i>	+
<i>Sorghum halepense</i>	1
<i>Symphytum officinale</i>	2
<i>Taraxacum officinale</i>	3
<i>Thlaspi perfoliatum</i>	+
<i>Tragopogon orientalis</i>	2
<i>Trifolium pratense</i>	+

Continued

<i>Trifolium repens</i>	+
<i>Veronica arvensis</i>	+
<i>Veronica chamaedrys</i>	+
<i>Veronica persica</i>	2
<i>Veronica serpyllifolia</i>	+
<i>Vicia grandiflora</i>	1
<i>Vicia sepium</i>	+
<i>Viola suavis</i>	2

3.3.2. Raising Public Awareness

The floristic richness of these two grassland areas was showcased on the demonstration plot. This demonstration plot is a small plot of 10 × 10 m that was properly signaled and advertised for visitors. An explanatory panel was placed in a visible and easily accessible place, with short and important information. The demonstration plot was included in the guided visiting tours and visitors received at the botanical garden's entrance a map with a marked location of the demonstration plot. Our plot was intended for the public as well as for decision maker visitors. The authorities from our region showed interest in this grassland showcase and consider it a good opportunity to replicate such demonstration plots in other towns as an ecotourism attraction that showcases the region's natural and cultural beauty.

4. Conclusions

Transylvanian grasslands are biodiversity hotspots of global significance, offering unparalleled opportunities for scientific research. They are living laboratories for understanding ecological processes, sustainable management, and the impacts of climate change. The grasslands of Transylvania are irreplaceable ecological and cultural treasures, but they face significant challenges in the modern world. Through a combination of traditional practices, modern conservation science, community involvement, and international cooperation, these unique landscapes can be preserved for future generations. However, sustained funding, research, and public commitment are crucial to ensure the long-term survival of Transylvanian grasslands.

Their conservation is not only critical for preserving Europe's natural heritage but also for advancing our understanding of biodiversity and ecosystem functioning worldwide. By protecting these unique ecosystems, we preserve a treasure trove of ecological knowledge that can guide future conservation efforts and inform sustainable land-use practices globally.

Acknowledgements

Part of the work of this paper was funded by Botanical Garden Conservation In-

ternational Association (BGCI) through BGCI Global Botanic Garden Fund—BGCI Member Grant project “Conservation of semi-natural dry grasslands of Transylvania” 2023-2024 granted to O.S. and P-M. S.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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