BIO-ECONOMIC ANALYSIS OF THE FLORA AND VEGETATION OF THE GRASSLANDS OF THE MEȘENDORF ECOLOGICAL FARM (BRAȘOV COUNTY, ROMANIA)

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Abstract. The paper presents the results of the botanical and phytosociological study on the natural grasslands of the Meșendorf mixed ecological farm (Transylvanian Natural Product). Floristic researches show a high floristic and phytosociological biodiversity, determined by pedo-climatic and microstational factors. The flora includes 329 species of cormophytes belonging to 111 genera of 37 botanical families. The vegetation of the grasslands comprises 12 plant associations, of which the phytocoenoses of the Festucetum pratense association are dominant. The quantitative studies performed evidence the dominance of good and very good fodder species.

INTRODUCTION

The Meșendorf mixed farm is situated in the north of the Brașov county, south-west of the European road E 15, at about 8 km distance from the road bifurcation towards the locality Criț, at the entrance to the Saxon locality Meșendorf. The forms of relief consist of hills and depressions, with an altitude ranging between 520-650 m. Climate is continental, with a mean multiannual temperature of approximately 7.2ºC, and a mean annual atmospheric precipitation of about 780 mm.

From the point of view of vegetation, the area is situated in the hill belt, covered with deciduous forests. Following forest clearing, secondary grasslands have established, which are used by natives as pastures and hayfields. Along the streams, wood vegetation appears, formed by shrubs and willow bushes. Forest remnants are found on higher steep hills, unsuitable for agriculture.

MATERIALS AND METHODS

The surface of the Meșendorf ecological farm is of about 400 ha, including slopes with different exposures and inclinations, as well as slow valleys. For the study of flora, we covered the whole surface, noting all identified species. The checking and determination were done according to the Romanian Flora, updated based on the Flora Europaea monograph. For
each species, the bioform, the geoelement and the main ecological indices (moisture, temperature and soil chemical reaction) were noted. The vegetation was analyzed based on phytosociological relevés, which were performed in all grassland types. For the quantitative analysis of phytocoenoses, we used the Braun-Blanquet scale. Based on dominant species, using the literature, we ranged the phytocoenoses in plant associations.

RESULTS AND DISCUSSION

1. Floristic composition of the farm grasslands. The studies performed show a high floristic biodiversity of these grasslands. Thus, we identified 329 species of cormophytes belonging to 111 genera of 37 botanical families. The families with the highest number of species are: Asteraceae, Fabaceae, Poaceae, Lamiaceae, Apiaceae, etc. The quantitatively dominant species are those of the Poaceae family, followed by those of the Fabaceae family. A significant proportion of the species of these families are very good and good fodder species. However, the high biodiversity is given by the numerous species belonging to other botanical families which, although they are not very good fodder plants, indicate a low degree of anthropic impact on most of the surface of the analyzed natural grasslands.

![Diagram of ecological indices](image1.png)

**Fig. 1.** Diagram of ecological indices (a), bioforms (b) and geoelements (c) of the grassland flora

The analysis of the main ecological indices (Fig. 1.a) evidences the mesoxerophilic to mesophilic ($U_2 = 39.32\%$, $U_3 = 35.36\%$), micro-mesothermal ($T_3 = 46.34\%$), and weak acid-
neutrophilic to acid-neutrophilic character ($R_4 - 33.23\%$, $R_3 - 27.74\%$) of the flora of these grasslands.

The analysis of the flora according to bioforms shows the clear dominance of hemicryptophytes (55.3%), followed at a considerable distance by therophytes (29.78%). The high proportion of therophytes (Fig.) can be explained by the anthropo-zoogenic impact consisting of manure deposits, culture of fodder species, uncultivated arable land, which are real reservoirs of weed seeds that reach the farm grasslands. Phanerophytes incidentally reach the grasslands, in particular those in the proximity of woods or streams. The dominant floristic elements (geoelements) are Eurasian ones, with 50.15%, followed by European (13.67%) and central European (8.2%) ones.

Pedoclimatic conditions have favored the formation of microstations in which some thermophilic species (Mediterranean, Submediterranean, Atlantic, Pontic) whose proportion is significant (15.75%) have found shelter. From a phytogeographical point of view, the studied surface belongs to the Euro-Siberian region, the East Carpathian Central European province (Dacian Carpathians), the Transylvanian Plateau area.

The qualitative spectrum of the economic categories of the grassland flora of the Meșendorf farm shows it high economic potential. Fodder species, which are quantitatively dominant, also have a high qualitative percentage (21%). Of the 34 species of Poaceae identified in these grasslands, some very good fodder species (Festuca pratensis, F. rupicola, Poa pratensis, Agrostis capillaris, A. stolonifera, Lolium perenne) cover the largest surfaces. Some surfaces are dominated by very good fodder Fabaceae species (Trifolium pratense, T. repens, Lotus corniculatus, Onobrychis viciifolia).

In addition to fodder species, numerous medicinal species (14%) are found in these grasslands, melliferous species (10%) and valuable species for different industries (household industry, natural dye industry). Toxic species, which contain certain substances harmful for humans or herbivorous animals, also have a significant percentage (23%). The negative effect of these species is low, because in general they are poorly represented from a quantitative point of view.

2. Vegetation of the farm grasslands. From a phytosociological point of view, the area belongs to the hill belt. Natural grasslands are secondary, being established following the past
clearings of oak, hornbeam, and other deciduous woods. The identified plant associations belong both from the point of view of their number and extension to the MOLINIO-ARRHENATHERETEAE class. This class includes mesophilic and meso-hygrophilic phytocoenoses that grow in brown luvic or brown acid soils, on slopes characterized by a high content of nutritive substances and variable moisture. The floristic structure of these phytocoenoses is considerably influenced by human activity. In moisture-rich soils, meso-hygrophilic and hygrophilic phytocoenoses belonging to the Molinietalia order are established. The valley slopes are populated with mesophilic phytocoenoses belonging to the Arrhenatheretalia order.

On steeper slopes exposed to the sun, phytocoenoses of the FESTUCO-BROMETEA class (phytocoenoses of the Festucetum sulcatae association) have established on limited areas.

The dominant association is Festucetum pratensis. On small surface areas, under specific pedological and microclimatic conditions, as well as under the influence of the anthropozoogenic factor, phytocoenoses of other associations have established. In depression areas with excessive moisture (in particular along streams), hygrophilic vegetation dominated by phytocoenoses of the Phragmitetalia alliance, the PHRAGMITETEAE class, has established.

The coenotaxonomic conspect of grasslands within the farm area:

**MOLINIO – ARRHENATHERETEAE**

Molinietalia
Alopecurion pratensis

1. Festucetum pratensis Soó 1938
Holco-Juncion

Deschampsietalia caespitosa(e)
Deschampsion caespitosa(e)

3. Deschampsietum caespitosa(e) (Horvatić 30) Soó 1971

Agrostideto-Festucetalia rubrae
Cynosurion cristati

4. Anthoxantho-Agrostietum tenuis Sillinger 1933; Jurko 1969

Arrhenatheretalia elatioris
Arrhenatheretion elatioris

5. Arrhenatheretum elatioris (Br.-Bl. 1925) W. Koch 1926

Molinietalia
Agrostion albae

6. Poëtum pratensis Râv., Căzăc., Turenschi, 1956

FESTUCO-BROMETEA
**Festucetalia valesiaceae**

Festucion ripicolae

7. *Festucetum valesiaceae-sulcatae* Csürös et Kovacs 1962

**PLANTAGINETEA MAJORIS**

*Plantaginetalia majoris*

Agropyro-Rumicion crispi

8. *Trifolio repenti – Lolietum* Krippelova 196


**EPILIBIETEA ANGUSTIFOLII**

*Epilobieta angustifoli*  

Epilobion angustifolii

10. *Calamagrostidetum epigeii* Jurasek 1928

**PHRAGMITETEAE**

*Phragmitetalia*

Phragmition communis

11. *Scirpo-Phragmitetum* W. Koch 1926

**CHENOPODIETEAE**

*Sisymbrietalia*

Sisymbriion officinalis

12. *Brometum arvensis* Kiss 1964

**Description of main plant associations.**

1. *Festucetum pratensis* Soó 1938 (*Table 1, rel 1*). The phytocoenoses of this association grow on almost plane surfaces or surfaces with a small inclination and a different exposure. It is the most widely distributed association within the farm area and it has the richest floristic composition. It has a meso-hygrophilic character and grows in humico-gleic soils. The dominant species of the association is *Festuca pratensis* (fescue), accompanied by mesophilic species (*Table 1*) and in particular those characteristic of the Cynosurion alliance. From an economic point of view, these grasslands are extremely valuable, both in terms of fodder production and fodder nutritive value.

2. *Holcetum lanati* Issler 1936 em (*Table 1, rel 2*). Velvet grass usually establishes on abandoned culture surfaces, being a stage in the lying fallow of these surfaces. Consequently, it grows on slow slopes (*Table 1, rel. 2*). The floristic composition is reduced due to the high coverage of the dominant species.

3. *Deschampsietum caespitosae* (Horvatić 30) Soó 1971 (*Table 1, rel 3*). These grasslands occupy small surfaces in wet microstations, on almost plane surfaces (*Table*). Due to
the luxuriant development of the edificator species, the floristic composition of these phytocoenoses is reduced, consisting in particular of hygrophilic and meso-hygrophilic species.

7. *Festucetum valesiacae-sulcatae* Csürös et Kovacs 1962 (*Table 1, rel 7*). This is one of the associations distributed over large farm areas. It establishes on sunny slopes with variable, sometimes high inclination (Table). The floristic biodiversity in the phytocoenoses of this association is high, more than 70 species being identified in the 3 relevés. Given the low general coverage as well as the low height of Poaceae species, their production is lower compared to that of the phytocoenoses of the dominant association *Festucetum pratense*. However, the association is economically important because it occupies surfaces with less favorable climatic conditions. We consider that this association is in expansion, as we have identified extensive surfaces of weedy grasslands, where the two edificator species establish.

8. *Trifolio repentii–Lolietum Krippelova 1967* (*Table 1, rel 8*). White clover and perennial ryegrass grasslands are found on sunny slopes (western and south-eastern exposure), covering low slope areas (5 degrees), which reflects the mesophilic to hydrophilic character of the soil in which they grow. Edificator phytocoenoses frequently establish on well-worn areas.

9. *Scirpo-Phragmitetum* W. Koch. 1926 (*Table 1, rel 9*). Reed stands are established in wet, relatively plane areas (3-4 degrees), with western exposure, or along slow streams whose flow decreases considerably in dry summers. The edificator *Phragmites australis* species has a mean coverage of 85% and a luxuriant development (up to 4 m height).

10. *Junco-Menthetum* Lohm. 1953 (*Juncetum inflexi* Nedelcu 1973) (*Table 1, rel 10*) is a poorly represented association in these grasslands, both in terms of distribution and floristic composition. The only releve performed evidences a phytocoenosis fragment established in an almost plane area (2-3 degree inclination), with excessive moisture, with western exposure. The edificator species, *Juncus inflexus*, has a mean coverage of 85%, and *Carex vulpina* and *Carex hirta* grow in a much lower percentage (10%), which suggests the evolution towards the sub-association *Caricetosum Hodișan 1966* (*montanum* Raclaru 1970)

11. *Calamagrostietum epigeii* Jurasek 1928 (*Table 1, rel 11*). This association grows in wet soils resulting from forest clearing. We identified it at the edge of the farm, in one releve, on a slope with western exposure, as a narrow band at the edge of a shrub stand. The analyzed
phytocoenosis is poor from a floristic point of view, the edificator species, *Calamagrostis epigeios*, having a luxuriant development (mean coverage over 85%).

12. *Brometum arvensis* Kiss 1964 (*Table 1, rel 12*). The phytocoenoses of this association populate farming lands that have been abandoned for several years, on low slopes with western exposure. They are well knitted together (90-98% general coverage, the edificator species having the highest percentage). As the land lies fallow, a number of perennial species appear and the association evolves towards other associations.

BIBLIOGRAPHY


