# CHARACTERIZATION OF SOME GRASSLAND FROM TRANSILVANIAN PLATEAU

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**Abstract**

Meadows differ from one another depending on static conditions and productivity. The purpose of this research is to assess the state of the biodiversity and pastoral value for grasslands from the Transylvanian Plateau area. Also, there has been analyzed the floristic composition and a series of ecological indexes, respectively humidity, soil reaction, temperature and nitrogen. Other aspects taken in account were the agronomical and anthropogenic specters. The analyzed grasslands are placed in the perimeter of Gheorgheni village, from Cluj County. Experience includes 16 experimental variants with organic fertilization with slurry, 4 variants in 4 rehearsals. Each experimental variant is 2 m long X 5 m wide. In most hill meadows the economic efficiency is relatively low, and in order to be increased, it is necessary to apply the whole complex of measures for their improvement, care and exploitation, of which a special role is the application of appropriate treatments that stimulate the development of valuable species.

**Key words**: (min. 3 – max. 5): Transylvanian Plateau, diversity, grasslands

In general, the value of slurry as fertilizer is fairly high, because it contains nutrients in a readilyavailable form. Although on a mass base the nutrient contents are much lower than in regular mineral fertilizers, which has consequences for handling and the required application rates. The nutrient contents of slurry may fluctuate depending on the composition of the manure that is digested and possible N losses during the anaerobic digestion and subsequent storage and handling. These fluctuations in nutrient contents will affect the value as a fertilizer (Bonten *et al*, 2014).

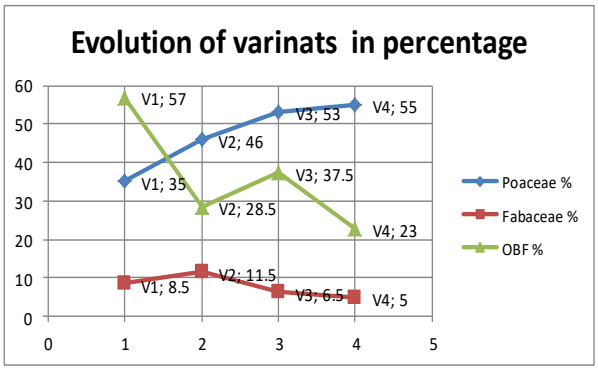


Figure 1. **Evolution of variants fertilized with slurry**

Tabel 1

**Ecological and agronomical spectrum of *Agrostis capillaris - Festuca rupicola* grassland type**

| Ecological spectrum | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Eclg. indexes** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **X** | |
| U-V1 | 0 | 0 | 8 | 48.5 | 5 | 0 | 0 | 0 | 0 | 26 | 3.95 |
| U-V2 | 0 | 0 | 9 | 51.5 | 1 | 0 | 0 | 0 | 0 | 18.5 | 3.87 |
| U-V3 | 0 | 0 | 15.5 | 33.5 | 5.5 | 0 | 0 | 0 | 0 | 40 | 3.82 |
| U-V4 | 0 | 0 | 15.5 | 26.5 | 2 | 0 | 0 | 0 | 0 | 36 | 3.69 |
| Average of U % | | | | | | | | | | | 3.83 |
| R-V1 | 0 | 0 | 0 | 0.5 | 8.5 | 0 | 17 | 21.5 | 0 | 40 | 7.06 |
| R-V2 | 0 | 0.5 | 0 | 0.5 | 7.5 | 0 | 31.5 | 20 | 0 | 20 | 7.02 |
| R-V3 | 0 | 0 | 0 | 0 | 1 | 0 | 16.5 | 28.5 | 0 | 48.5 | 7.58 |
| R-V4 | 0 | 0.5 | 0 | 0 | 0.5 | 0.5 | 16.5 | 19 | 0 | 43 | 7.41 |
| Average of R % | | | | | | | | | | | 7.27 |
| N-V1 | 0 | 9 | 16.5 | 31 | 8.5 | 12 | 0.5 | 0 | 0 | 10 | 3.99 |
| N-V2 | 0 | 6 | 4.5 | 54.5 | 2.5 | 8.5 | 0 | 0 | 0 | 4 | 4.04 |
| N-V3 | 0 | 16 | 10 | 47.5 | 2.5 | 9 | 0 | 0 | 0 | 9.5 | 3.75 |
| N-V4 | 0 | 16 | 7.5 | 44.5 | 6 | 2.5 | 0 | 0 | 0 | 3.5 | 3.63 |
| Average of N % | | | | | | | | | | | 3.85 |

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| Agronomic spectrum | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agron. indexes** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **X** | |
| C-V1 | 0 | 0 | 13 | 14.5 | 30 | 12.5 | 14.5 | 3 | 0 | 0 | 5.11 |
| C-V2 | 0 | 2.5 | 29 | 9 | 9.5 | 16 | 13.5 | 0.5 | 0 | 0 | 4.63 |
| C-V3 | 0 | 0 | 8.5 | 4.5 | 24 | 36 | 16.5 | 5 | 0 | 0 | 5.66 |
| C-V4 | 0 | 0 | 13 | 1.5 | 8 | 34.5 | 22 | 1 | 0 | 0 | 5.68 |
| Average of C % | | | | | | | | | | | 5.27 |
| P-V1 | 0.5 | 3.5 | 8.5 | 31.5 | 11 | 13.5 | 8 | 11 | 0 | 0 | 5.02 |
| P-V2 | 0.5 | 1 | 8 | 17 | 16 | 29.5 | 5.5 | 2.5 | 0 | 0 | 5.13 |
| P-V3 | 0.5 | 3.5 | 8.5 | 23 | 32.5 | 8.5 | 15 | 3 | 0 | 0 | 4.95 |
| P-V4 | 0.5 | 2 | 3 | 10 | 32.5 | 15 | 13.5 | 3.5 | 0 | 0 | 5.36 |
| Average of P % | | | | | | | | | | | 5.12 |
| S-V1 | 0 | 4 | 16.5 | 23 | 19 | 14 | 8.5 | 2.5 | 0 | 0 | 4.66 |
| S-V2 | 0 | 1.5 | 10.5 | 12 | 18.5 | 29.5 | 5.5 | 2.5 | 0 | 0 | 5.13 |
| S-V3 | 0 | 4 | 8.5 | 19 | 34.5 | 11 | 15 | 2.5 | 0 | 0 | 5.01 |
| S-V4 | 0 | 2.5 | 5 | 8 | 35 | 15 | 13.5 | 1 | 0 | 0 | 5.24 |
| Average of S % | | | | | | | | | | | 5.01 |
| VF-V1 | 0.5 | 0 | 16 | 25.5 | 19.5 | 19.5 | 5 | 1 | 0.5 | 0 | 4.71 |
| VF-V2 | 0.5 | 3 | 5 | 16 | 32.5 | 17 | 3 | 3 | 0 | 0 | 4.94 |
| VF-V3 | 0 | 0 | 1 | 33 | 17 | 35 | 5 | 1 | 2.5 | 0 | 5.24 |
| VF-V4 | 0 | 0.5 | 2.5 | 19.5 | 15.5 | 39.5 | 1 | 1.5 | 0 | 0 | 5.25 |
| Average of VF % | | | | | | | | | | | 5.04 |

**Legend**

**U** humidity
**R** soil reaction
**N** nutrition
**C** mowing
**P** grazing
**S** crushed
**VF** fodder value
**V1**-witness,
**V2**-10 l/ha slurry
**V3**-20 l/ha slurry
**V4**-40 l/ha slurry

Table 2.

**Floristic composition of the type of grassland *Agrostis capillaris - Festuca rupicola* and specific requirement on ecological, agronomic and anthropogenic (B - BioForm, T - temperature, U - humidity, R - soil reaction, N – nutrition, C - tolerance of mowing, P - tolerance of grazing, S - tolerance of crushed, VF- fodder value, H - hemerobie, UR - urbanophile, SO - sozological category, -Average, ADm- mean abundance – dominance)**

| T | U | R | N | C | P | S | VF | SO | H | UR | Specii | V1 | V2 | V3 | V4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| x | x | x | 4 | 6 | 5 | 5 | 6 | n | 2 - 4 | 3 | *Agrostis capillaris* | 8 | 12.5 | 29 | 29 |
| x | x | 5 | x | 7 | 5 | 5 | 4 | n | 2 - 4 | 2 | *Anthoxantum odoratum* | 0.5 | 2.5 | 0.5 | 0.5 |
| 6 | 5 | 7 | 7 | 6 | 3 | 3 | 8 | n | 3 - 4 | 2 | *Arrhenatherum elatius* | 0.5 | | | |
| 5 | 3 | 8 | 3 | 5 | 4 | 4 | 6 | n | 2 - 3 | 2 | *Bromus erectus* | | 0.5 | | |
| 5 | 4 | 7 | 4 | 3 | 6 | 6 | 5 | n | 2 - 3 | 2 | *Brachipodium pinatum* | 12.5 | 17.5 | 8 | 12.5 |
| x | x | x | 3 | 4 | 4 | 4 | 5 | n | 2 - 3 | 2 | *Briza media* | 0.5 | 0.5 | 0.5 | 0.5 |
| x | 5 | x | 6 | 8 | 4 | 6 | 9 | n | 3 - 4 | 3 | *Dactylis glomerata* | 0.5 | | 2.5 | |
| 7 | 3 | 8 | 2 | 7 | 7 | 7 | 4 | n | 2 - 3 | 2 | *Festuca rupicola* | 12.5 | 12.5 | 12.5 | 12.5 |
| x | 4 | 7 | 4 | 6 | 4 | 4 | 7 | n | 2 - 4 | 3 | *Lotus corniculatus* | 2.5 | 2.5 | 2.5 | 0.5 |
| 7 | 3 | 8 | x | 6 | 2 | 2 | 8 | n | 3 - 4 | 1 | *Onobrychis viciifolia* | 0.5 | 0.5 | 0.5 | 0.5 |
| x | 3 | 8 | 2 | 5 | 4 | 4 | 6 | n | 2 - 3 | 1 | *Trifolium montanum* | 2.5 | 0.5 | 2.5 | 2.5 |
| | | | | | | | | | | | *Trifolium ochroleucum* | | 5 | 0.5 | |
| x | x | x | 6 | 7 | 4 | 4 | 8 | n | 3 - 4 | 2 | *Trifolium pratense* | | 2.5 | 0.5 | 0.5 |
| x | x | x | 6 | 8 | 8 | 8 | 8 | n | 3 - 5 | 3 | *Trifolium repens* | | | | 0.5 |
| x | 5 | x | 6 | 6 | 1 | 2 | 6 | n | 3 - 4 | 2 | *Vicia cracca* | 0.5 | 0.5 | 0.5 | 0.5 |
| x | 4 | x | 5 | 7 | 4 | 5 | 6 | n | 2 - 4 | 3 | *Achilea milefolium* | 8 | 2.5 | 2.5 | 5 |
| x | x | x | 2 | 4 | 4 | 4 | 4 | n | 2 - 3 | 2 | *Campanula rotundifolia* | 0.5 | | 0.5 | |
| x | x | x | x | 5 | 4 | 4 | 4 | n | 3 - 4 | 2 | *Centaurea jacea* | 8 | | 8 | |
| 5 | 5 | 6 | 5 | 6 | 2 | 2 | 4 | n | 3 - 4 | 3 | *Crepis bienis* | | | | 0.5 |
| 5 | 4 | 7 | 2 | 3 | 4 | 4 | 4 | n | 2 - 3 | 2 | *Dianthus carthusianorum* | 0.5 | | 0.5 | 0.5 |
| 6 | 5 | 7 | 5 | - | - | - | 3 | n | 4 - 5 | 4 | *Dipsacum fullolum* | | | | |
| | | | | | | | | | | | *Equisetum arvense* | 2.5 | 5 | 2.5 | 2.5 |
| 7 | 3 | 8 | 4 | 2 | 4 | 3 | 2 | n | 2 - 4 | 2 | *Eryngium campestre* | | 2.5 | | |
| X | 4 | 8 | X | 4 | 8 | 7 | 1 | n | 2 - 4 | 2 | *Euphorbia cyparisias* | 0.5 | | | |
| 7 | 4 | x | 3 | 4 | 2 | 2 | 5 | n | 2 - 3 | 1 | *Filipendula hexapetala* | 2.5 | 0.5 | 0.5 | 0.5 |
| 5 | 4 | 7 | 3 | 5 | 4 | 4 | 5 | n | 2 - 3 | 2 | *Galium verum* | 0.5 | | 2.5 | |
| 3 | 5 | 4 | 2 | 5 | 6 | 6 | 4 | n | 3 - 4 | 2 | *Hieracium aurantiacum* | 0.5 | | | |
| | | | | | | | | | | | *Laserpitium latifolium* | 0.5 | | | 0.5 |
| x | 5 | x | 5 | 7 | 7 | 7 | 5 | n | 3 - 4 | 3 | *Leontodon autumnalis* | 0.5 | | | 0.5 |
| X | 4 | X | 3 | 6 | 3 | 4 | 5 | n | 3 - 4 | 2 | *Leuchanthemum vulgare* | | | 0.5 | 0.5 |
| x | 4 | 8 | 3 | 4 | 8 | 8 | 5 | n | 2 - 4 | 2 | *Plantago media* | 2.5 | 2.5 | 2.5 | 0.5 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| x | x | x | x | 7 | 6 | 6 | 6 | n | 2 - 4 | 3 | *Plantago lanceolata* | 0.5 | 0.5 | 0.5 | 2.5 |
| x | 4 | 8 | 3 | 5 | 5 | 5 | 4 | n | 2 - 3 | 2 | *Primula veris* | 2.5 | 0.5 | 2.5 | 0.5 |
| 6 | 4 | 7 | 3 | 6 | 5 | 4 | 4 | n | 2 - 4 | 2 | *Ranunculus bulbosus* | | | 0.5 | 2.5 |
| x | x | x | 3 | 5 | 8 | 3 | 3 | n | 2 - 3 | 1 | *Rhinanthus minor* | 8 | | 0.5 | 2.5 |
| 5 | 4 | 2 | 2 | 7 | 4 | 4 | 2 | n | 2 - 5 | 2 | *Rumex accetosela* | | 0.5 | | 0.5 |
| 6 | 4 | 8 | 4 | 5 | 3 | 3 | 4 | n | 2 - 3 | 2 | *Salvia pratensis* | 8 | 8 | 8 | 2.5 |
| x | 4 | 4 | x | 4 | 5 | 5 | 1 | n | 2 - 4 | 2 | *Stelaria graminea* | | 0.5 | | |
| x | 5 | x | 6 | 8 | 7 | 7 | 7 | n | 3 - 5 | 3 | *Taraxacum officinale* | 2.5 | 0.5 | 2.5 | 0.5 |
| x | 4 | 5 | 6 | 4 | 4 | 4 | 3 | n | 2 - 3 | 2 | *Thymus pulegioides* | 8 | 5 | 0.5 | |
| 5 | 4 | 7 | 6 | 6 | 2 | 2 | 5 | n | 3 - 4 | 2 | *Tragopogon pratensis* | 0.5 | | 2.5 | 0.5 |

## MATERIALS AND METHODS

Study site

The analyzed grasslands are located within the perimeter of the village of Gheorgheni, in Cluj County. The experience includes 16 experimental variants with slurry fertilization 4 variants in 4 rehearsals. Each experimental variant is 2 m long x 5 m wide. The experimental variants are V1-witness, unfertilized, V2-10 kg slurry, V3-20 kg slurry, V4-40 kg slurry. Slurry was pick from a cow farm from the same village and spread mannualy.

The area shows a typical plain until hillside climate and the landscape is undulating. It is characterized by a high variation of land use and topoclimatic conditions in the area and fine-grained mosaic of different land uses, including substantial amounts of semi natural vegetation with 7.2°C average temperature. The vegetation observations were made on 16 plots.

Data analysis

The floristic composition was interpreted using an improved Braun-Blanquet scale with subdivisions (Păcurar and Rotar, 2014). Sward fodder value was calculated based on species quality score on a scale from 1 (poor) to 9 (excellent), after Dierschke and Briemle (2002), as modified by Păcurar and Rotar (2014). Sward fodder value was performed on a scale from 1 (poor sward, quality dominated by toxic species) to 9 (excellent) after Păcurar and Rotar (2014). Data regarding the share of economic groups (Poaceae, Cyperaceae-Juncaceae, Fabaceae and other botanical families- OFB), species number were processed by analysis of variance. Plant resistance against interference mechanical, such as mowing, grazing and crushed materialized by value indicator (from 1-9) after Dierschke and Briemle (2002), and the names of appropriate species depending on the category disturbance were taken after Păcurar and Rotar (2014). Based on data from spectrum it can be calculate the average indicator of a phytocenosis.

## RESULTS AND DISCUSSIONS

The influence of slurry fertilization during the second year of experience also determines major changes in the floristic composition. Our result shows that plants from other botanical families (AFB) have the largest share in the canopy, followed by Poaceae and Fabaceae.

In the floristic composition, Poaceae family have in the witness an average participation of 35%, and once by increasing the dose of slurry fertilization the Poaceae increase also their number. In the variant with 40 l/ha slurry (V4) the number of Poaceae increase untill 55%.

Regarding Fabaceae family it can be noticed that after 2 years of applied fertilizer, the percent of participation decrease. We believe this is due to N-fertilizer (Vîntu *et al*,2004). The highest percent is in V2 (variant with 10 l/ha slurry) where the species *Trifolium ochroleucum* have an important influence (table 1).

Plants from other botanical families (OFB) are present with 57% coverage in the witness and decrease until 23% in variant fertilized with 40 l/ha slurry.

The type of grasslands determinated is *Agrostis capillaris-Festuca rupicola.* Following the ecological spectrum, of these type of grasslands the phytococenosis has a meso-xerophilic caracter (average of U = 3.83), neutrophil (average of R = 7.27) and oligomezotroph (average of N= 3.85).

From the agronomic point of view, phytocenosis of the type *Agrostis capillaris-Festuca rupicola* is medium tolerant to mowing (average of C = 5.27), have a medium grazing tolerance (average of P = 5.12) and medium tolerant to crushed (average of S = 5.01). From the analysis of these factors, we can say that the grassland has a maximum of two grazing cycles per year, in which the plants are partially consumed in a semi-extensive system. In fact, the appreciation of the consumption level supports the assertions (table 2).

The type of grassland *Agrostis capillaris-Festuca rupicola* has a pastoral value of 5.04, so this meadow falls in the 6$^{th}$ grade, the meadow category is medium and supports 1.01-1.20 LU/ ha.

## CONCLUSIONS

The slurry fertilization have an important role on floristic composition which is noticed until second year. Not only the massive fertilizer doses cause changes in the floristic composition but also small doses of slurry fertilizer.

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