MONITORING OF GRASSLANDS IN SARAVALE COMMUNE

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Abstract. *The importance of permanent pastures is highlighted by their crucial role in providing food for animals, conserving biodiversity, protecting the soil and the environment, and their contribution to the development of sustainable agricultural systems. The purpose of this study is to manage the pastures in the Saravale Commune (Timis County, Romania) to achieve optimal production and maintain biodiversity, thereby protecting the surrounding environment. To determine the floristic composition and pastoral value of grasslands, field sampling methods are used, including floristic surveys on square sample plots, and the calculation of the Pasture Value Index (PVI) for assessing the quality of the pasture. PVI ranges from 0 (degraded pasture) to 100 (ideal pasture), providing essential information for the management and conservation of plants biodiversity.The Saravale Commune hosts four distinct grasslands, each containing a diverse range of plant species. For instance, Grassland I is dominated by Agropyron repens and includes valuable legumes such as Medicago lupulina. In GrasslandII, the predominant species are Vulpia myuros and Cynodon dactylon. Grassland III is led by Lolium perenne, while Grassland IV is characterized by Agrostis stolonifera. The removal of toxic species such as Euphorbia cyparissias and Achillea millefolium could improve the pasture's pastoral value.The aims of study were to improve the nutritional value of the grasslands in the Saravale Commune to enhance animal production and maintain a healthy ecological environment.*

Keywords*: grasslands, management, leguminous, grasses, plant diversity*

INTRODUCTION

Intensified grasslands, often associated with agricultural practices, can indeed be dominant in many European countries. These grasslands are usually characterized by high levels of management inputs such as fertilization, grazing, and cutting. While these practices may enhance productivity for agricultural purposes, they can have significant impacts on the ecological value and biodiversity of the grassland ecosystems (STROIA C. et.al., 2007; KVARNSTRÖM M. ELISABETH et. al.., 2004; MCCREA ALISON R. et. al., 2004; GILBERT JOANNE et. al., 2009).

Grasslands cover approximately 40% of the Earth's terrestrial surface and account for around 65% of the world's agricultural land area (OLDE VENTERINK et. al., 2001; TOOR G. S. et al., 2005; WACHENDORF MICHAEL et. al., 2018) In contrast to forests, grasslands have received comparatively less attention within the framework of multiple ecosystem services (BILOTTA G. S. et. al., 2007; ABDALLA M. et al., 2018, ISSELSTEIN J. et. al., 2005). This is unfortunate because grasslands play a crucial role in food production, and extensively managed grasslands contribute significantly to maintaining high biodiversity and essential ecological processes, such as pollination and water regulation, at local and landscape scales (TÖRÖK P., 2018). Additionally, they possess significant cultural value, serving as legacies of ancient land use systems, appreciated for their beauty and are classified as high natural value habitats' by the EU. Although, grasslands can be affected by the salinity increases do to the climate change and pollution (ONIȘAN EMILIAN et al., 2023).

Permanent grasslands, composed mainly of leguminous and dominant grass species, cover 31% of Romania's agricultural land, providing fodder for a significant portion of the bovine and ovine populations (PEETERS A., 2012). Pastures serve vital economic, ecological, and landscape functions, contributing to activities such as pasture utilization, biodiversity

conservation, and soil protection against erosion (HOPKINS ALAN and BRIGITTE HOLZ, 2006). These ecosystems are crucial for cattle nutrition, and efforts towards more sustainable agricultural systems aim to enhance their role in animal production systems (HABEL J. C., 2013).

The main objective of this study is to improve the nutritional value of the grasslands in the Saravale Commune. By increasing vegetation production, the aim is to boost animal yields and, consequently, contribute to the well-being of their owners. The study involves identifying, establishing, and characterizing the existing vegetation, with a focus on ecologically rational and controlled exploitation of these grasslands (GILLET F. et. al., 2016; PROBO M., 2016; SĂRĂȚEANU V., 2008; QIN Z., 2022). It is anticipated that this approach will lead to an increase in biodiversity of the plant cover and the protection and enhancement of soil quality. The organization of rational grazing is oriented towards creating a pleasant image of the grasslands, maintaining a neat appearance. Through the conservation of biodiversity, the plant cover will provide a colorful and enchanting view during the summer period.

MATERIAL AND METHODS

The commune of Saravale is a rural administrative division in Timiș County, Banat, Romania. It consists solely of the residential village with the same name. Positioned in the northwest part of Timiș County, it is located 65 km away from Timișoara and 10 km from Sânnicolau Mare. The commune is situated at an altitude ranging from 83 to 87 meters. The territory of Saravale commune is part of the Banat plain and is situated on the first terrace of the Mureș River, which is located at a distance of 8 km from it. The average annual temperature at the nearest weather station is 10.8°C, the average precipitation is relatively low (544.3 mm), and the number of rainy days is limited throughout the year (less than 110 days). These values indicate the arid, steppe-like nature of the climate in this area. The temperature over the course of the year shows a multi-year average of -1.7°C in January and 21.7°C in July. Floristic composition in permanent grasslands was studied using various relevé methods based on the study area's size. The goal was to collect data for identifying different plant communities, considering the impact of abiotic factors and anthropogenic influences on vegetation dynamics. The management approach significantly affects the evolution of floristic structure and vegetation in permanent grasslands. Floristic composition was determined through geobotanical relevés, utilizing square sample areas with 3 samples for grasslands up to 100 ha and 3-5 for those over 100 ha. Sample areas were chosen diagonally, with pegs marking floristically uniform portions. Sample areas were a minimum of 100 sqm. Adjacent areas were also explored for accuracy, noting species encountered outside the sample area. Species were categorized into grasses, legumes, and other botanical families, with characteristics recorded for each, including life form, geoelement, synecological indicators, forage quality, and coverage degree. Dominance (D) reflects ground cover visually estimated and expressed on the Braun-Blanquet scale.The next step involved determining Pastoral Value (PV) using the formula:

$$VP=\sum PC\ (\%) \times IC/5$$

VP - Pasture Value Indicator (0-100);PC - Grass Cover Participation (%) regardless of the method of determination (AD, P, Cs, G); CI - Forage Quality Index;

This indicator categorized grassland quality, ranging from degraded to excellent, providing valuable insights for pasture management.

After determining the pastoral value indicator by dividing the score obtained from multiplying PC x CI by 5, it is estimated as follows:

-0-5 - degraded grassland;

-5-15 - very weak;
-15-25 - poor;
-25-50 - medium;
-50-75 - good;
-75-100 - very good.

The index obtained for VP ranges from 0 in a pasture with no forage value to 100 for a sown (ideal) pasture (STROIA C. et. al., 2022).

RESULTS AND DISCUSSIONS

Investigations of the main types of grassland found in the Saravale Commune were chosen for the study. Following field surveys, we determined the percentage of species participation. From figure 1 it can be seen that in meadow grassland I, the percentage of participation of grasses is 70.1%, while for meadow of grassland II, the percentage is 53.8% and 51.5% respectively.

As far as legumes are concerned, we can observe that the highest percentage of their participation is found in meadow grassland I with 20.1%. On the other grassland the percentage of leguminous plants is very low, in grassland III 1.8%, and even absent in grassland grassland II. As for the percentage of plant species from other families, it is higher in grassland II and III (28.1% and 24.1% respectively) and in the other two I and IV, their percentage is on average 13.0%. The first grassland group in Saravale commune consists mostly of an equal number of euryanotic species (17), but also species that prefer neutral soils (from weak acid to weak alkaline). Only one species, *Bupleurum tenuissimum*, which prefers only neutral and basic soils, is present in the composition of the meadow, covering an area of 0.4%.

The dominant species, *Agropyron repens*, which is a euryionic species, accounts for 33.4% of the 99.9% total, next to which we find a high proportion of euryionic grass species (*Cynodon dactylon*, *Alopecurus pratensis*, *Poa pratensis*), with the total of grasses in this meadow being 68.8%.

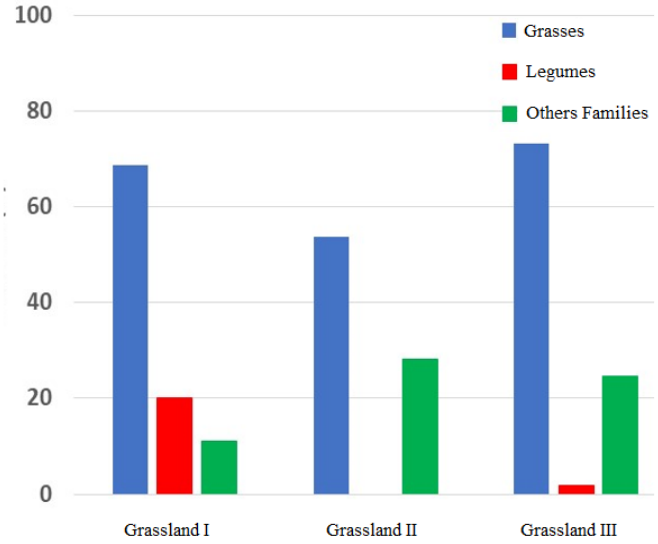

Figure 1. Percentage participation of species in the meadow of Saravale Municipality

From an agronomic point of view, considering only grass species, this meadow has a medium to good production potential. It should be taken into account that, of the proportion of grasses, 44.6% of the cover is provided by species that are productive and late (*Agropyron repens*, *Cynodon dactylon*). *Alopecurus pratensis*, and *Poa pratensis*, which are early productive species, provide 24.2% of the cover percentage. Basically, we have to consider that this meadow, at the beginning of the growing season, shows a higher degree of cover with productive species than the second growing season.

Table 1.

Establishment of the pastoral value (PV) of grassland I in Saravale

Species	**PC (%)**	**IC**	**PC × IC**
Grasses			
Agropiron repens	33.4	2	66.8
Alopecurus pratensis	19.1	4	76.4
Cynodon dactylon	11.1	2	22.3
Poa pratensis	5.1	4	20.4
Legumes			
Medicago lupulina	11.1	4	44.6
Trifolium hybridum	3.5	4	14.0
Vicia grandiflora	2.2	3	6.7
Lathyrus tuberosus	1.6	0	0.0
Lathyrus nissolia	1.0	0	0.0
Lotus corniculatus	0.6	4	2.6
Species of other botanical families			
Achillea setacea	1.0	2	2.0
Eryngium campestre	0.9	0	0.0
Rosa canina	0.6	0	0.0
Convolvulus arvensis	0.6	3	1.9
Cirsium arvense	0.6	0	0.0
Bupleurum tenuissimum	0.4	0	0.0
Limonium gmelinii	0.4	0	0.0
Daucus carota	0.3	2	0.3
Cichorium inthibus	0.3	1	0.3
Potentilla erecta	0.3	1	0.3
Carduus achantoides	0.3	0	0.0
Centaurea jacea	0.3	0	0.0
Dipsacus laciniatus	0.3	0	0.0
Agrimonia eupatoria	0.3	0	0.0
Euphorbia cyparissias	0.3	0	0.0
Gallium verum	0.3	0	0.0
Helminthoteca echioides	0.3	0	0.0
Inula ensifolia	0.3	0	0.0
Saligna lettuce	0.3	0	0.0
Seriola lettuce	0.3	0	0.0
Rumex crispus	0.3	0	0.0
Linaria vulgaris miller	0.3	0	0.0
Mentha pulegium	0.3	0	0.0
Senecio jacobaea	0.3	0	0.0
Prunus spinosa	0.3	0	0.0
Aster tripolim	0.3	0	0.0
Total			*258.5*
Pastoral value			*51.7*
VP Appreciation	*High*		

Legumes are well represented, accounting for a total of 20.1% of the total vegetation cover, of which only *Medicago lupulina* provides 11.1% cover. Half of the legume species are species with very good forage value (*Lotus corniculatus, Medicago lupulina*, *Trifolium hybridum*), providing 15.3% cover. Only one legume species (*Vicia grandiflora*) which has a good forage value provides a coverage percentage of 2.3%, while species with no forage value (*Lathyrus nissolia*, *Lathyrus tuberosus)* provide a coverage percentage of 2.5%.

The percentage of species from other botanical families is 11.2%, of which 3.5% is occupied by toxic (*Euphorbia cyparissias*) and harmful species (*Carduus achantoides*, *Cirsium arvense*, *Eryngium campestre*, *Euphorbia cyparissias*, *Prunus spinosa*, *Rosa canina*, *Rumex crispus*). From this point of view, this meadow requires maintenance work to remove these species.

The species present in the vegetation cover and their percentage of participation give this meadow a good pastoral value (VP = 51.7).

More than half of the species that make up the meadow grassland II in Saravale commune are euryanotic species (13) while six of the species are species that prefer neutral soils (weak acid to weak alkaline).

The dominant species, *Vulpia myuros*, which is a euryionic species, accounts for 29.87% of the total of 81.9%, next to which we find another euryionic grass (*Cynodon dactylon*) a species that prefers neutral soils, from weak acid to weak alkaline (*Bromus hordeaceus*), and one that prefers mostly acid soils (*Danthonia decumbens*), the total of grasses in this meadow being 53.8%.

From an agronomic point of view, considering only grass species, this meadow has a very poor production potential. It should be borne in mind that, of the proportion of grasses, 39.6% of the cover is provided by three species, two very early species with variable productivity during the first growing cycle (*Vulpia myuros*, *Bromus hordeaceus*) and one early species with very low productivity (*Danthonia decumbens*).

Only one grass species present (*Cynodon dactylon*) occupying 14.2% is a late species with high productivity. On this grasslandof grassland we have to take into account that in the first period we have a high coverage with species whose productivity is variable, and in the second period only a rather low percentage is provided by a species with high productivity.

Leguminous plants are absent from this meadow, while plants from other botanical families make up 28.1% of the area. Of these 3.5% are weedy species (*Achillea millefolium, Ambrosia artemisiifolia*, *Cirsium arvense*, *Eryngium campestre*).

The species present in the vegetation cover and their percentage of participation give this meadow a poor pastoral value (VP=7.6).

More than half of the species that make up meadow grassland III are euryanotic species (24), but it can be seen that species that prefer neutral soils (weakly acidic to weakly alkaline) are also fairly well represented (14). It can also be observed that in the floristic composition of this meadow, there is only one species that prefers moderately weakly acidic soils (*Matricaria perforata*) and one that is found mostly in acidic soils (*Prunella vulgaris*), the coverage of both being 0.3%. The dominant species, *Lolium perenne*, which is an euryionic species, accounts for 33.3% of the total 99.5%.

In addition to the dominant species, there are two other euryionic species (*Cynodon dactylon, Poa pratensis*) and three other grass species that prefer neutral soils (*Bromus hordeaceus, Hordeum murinum, Festuca pseudovina*), with a total of 73.1% grass species in this meadow.

Table 2.

Establishment of the pastoral value (PV) of grassland II in Saravale

Species	PC (%)	IC	PC × IC
Grasses			
Vulpia myuros	29.9	0	0.0
Cynodon dactylon	14.5	2	29.0
Danthonia decumbens	9.4	0	0.0
Bromus hordeaceus	0.3	2	0.6
Species of other botanical families			
Marubium peregrinum	19.7	0	0.0
Achillea millefolium	2.5	2	5.1
Capsella bursa pastoris	0.9	0	0.0
Convolvulus arvensis	0.3	3	0.9
Plantago lanceolata	0.3	2	0.6
Daucus carota	0.3	2	0.6
Cichorium intybus	0.3	1	0.3
Potentilla erecta	0.3	1	0.3
Leontodon crispus	0.3	1	0.3
Conyza canadensis	0.3	0	0.0
Verbascum phlomoides	0.3	0	0.0
Dianthus armeria	0.3	0	0.0
Eryngium campestre	0.3	0	0.0
Filago arvensis	0.3	0	0.0
Verbena officinalis	0.3	0	0.0
Ambrosia artemisifoliia	0.3	0	0.0
Cirsium arvense	0.3	0	0.0
Berteroa incana	0.3	0	0.0
Urtica dioica	0.3	0	0.0
Total			*37.8*
Pastoral value			*7.6*
VP Appreciation	*Very Weak*		

From an agronomic point of view, considering only grass species, this meadow has a good production potential. It should be taken into account that, of the proportion of grasses, 45.3% of the cover is provided by species that are productive and early (*Lolium perenne, Poa pratensis*), while *Festuca pseudovina*, which is an early species with low productivity, provides 2.7%. Two of the grasses present (*Bromus hordeaceus, Hordeum murinum*) are species with variable productivity in the first growing cycle, providing 14.5% cover, and one, covering 10.6% (*Cynodon dactylon*), is a late species with high productivity. Legumes are poorly represented, accounting for a total of 1.8% of the total vegetation cover, most of them having a very good forage value. Only one legume species has no forage value (*Ononis spinosa*).

The percentage of species of other botanical families in this meadow is 24.6%, of which 13.7% is occupied by toxic (*Euphorbia cyparissias*) and harmful species (*Achillea millefolium, Cirsium arvense, Euphorbia cyparissias, Matricaria perforata, Onopordum acanthium, Prunus spinosa, Rumex crispus, Urtica dioica*). From this point of view, this meadow requires maintenance work to remove these species.

The species present in the vegetation cover and their percentage of participation give this meadow a good pastoral value (VP = 56.3). The dominant species, *Agrostis stolonifera*, which is a euryion species, accounts for 38.0% of the total 99.4%. All other grass species are euryionic species except *Bromus hordeaceus* which is a species that prefers neutral soils, the total grass in this meadow is 51.5%.

Table 3.

Establishment of the pastoral value (PV) of grassland III in the village of Saravale

Species	**PC (%)**	**IC**	**PC × IC**
Grasses			
Lolium perenne	33.2	5	166.2
Bromus hordeaceus	13.6	2	27.2
Poa pratensis	12.1	4	48.3
Cynodon dactylon	10.6	2	21.1
Festuca pseudovina	2.7	1	2.7
Hordeum murinum	0.9	0	0.0
Legumes			
Medicago lupulina	0.6	4	2.4
Lotus corniculatus	0.3	4	1.2
Trifolium repens	0.3	4	1.2
Trifolium pratense	0.3	4	1.2
Species of other botanical families			
Cirsium arvense	9.1	0	0.0
Achillea millefolium	2.5	2	5.1
Daucus carota	1.2	2	2.4
Galium verum	0.6	0	0.0
Onopordum acanthium	0.6	0	0.0
Onopordum acanthium	0.6	0	0.0
Convolvulus arvensis	0.3	3	0.9
Plantago lanceolata	0.3	2	0.6
Potentilla erecta	0.3	1	0.3
Cichorium intybus	0.3	1	0.3
Potentilla erecta	0.3	1	0.3
Leontodon autumnalis	0.3	1	0.3
Juncus articulatus	0.3	0	0.0
Lamium purpureum	0.3	0	0.0
Mentha arvensis	0.3	0	0.0
Conyza canadensis	0.3	0	0.0
Potentilla reptans	0.3	0	0.0
Prunella vulgaris	0.3	0	0.0
Prunus spinosa	0.3	0	0.0
Rumex crispus	0.3	0	0.0
Sambucus ebulus	0.3	0	0.0
Urtica dioica	0.3	0	0.0
Verbena officinallis	0.3	0	0.0
Mentha arvensis	0.3	0	0.0
Euphorbia cyparissias	0.3	0	0.0
Filago arvensis	0.3	0	0.0
Urtica dioica	0.3	0	0.0
Verbena officinallis	0.3	0	0.0
Total			*281.7*
Pastoral value			*56.3*
VP Appreciation	*High*		

CONCLUSIONS

It can be noted that the two methods provided almost the same information in terms of grassland productivity, except that using the functional typology of grasses we can have a broader view of the grass growth strategies (dominant in each grassland), their phenology, their capacity to accumulate biomass, their frequency of use and their food value.

Thus, for the first pasture body, which is a pasture with good pastoral value and good production potential, it is noted that the highest productivity can be obtained in the second growing season, with more than double the percentage (44.6%) of late productive species compared to the percentage of early productive species (24.2%).

Grassland group II has a very low pastoral value and productivity due to the fact that it is dominated by poorly productive grass species in both the first and second growing seasons, even though there is one late productive species (*Cynodon dactylon*) in the vegetation cover, representing only 26.3% of the total grass species.

Grassland group III shows good pastoral value and productivity especially in the first growing season. Both in the second growing season and especially in the first, this meadow is dominated by species with high production potential, with poorly productive species accounting for only 23.6% of all grasses.

A fairly high percentage of toxic and harmful species were found on all four meadow, requiring control work.

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