Influence of Agronomic Practices on Grassland of *Agrostis capillaris* L. *Festuca rubra* L. from „Dealul Crucii” Meadow

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ABSTRACT

In Maramures County, meadows are used in a traditional system. They are dominated by *Agrostis capillaris* and *Festuca rubra*, with a mixed-use (grazing and mowing). The objective of our paper is to identify and describe species composition and assessment response to agronomic factors of the *Agrostis capillaris* L. - *Festuca rubra* L. grassland type, from „Dealul Crucii” meadow. The grassland of *Agrostis capillaris* L. - *Festuca rubra* L. has a floristic composition comprised of *Poaceae* (45.85%), *Cyperaceae* and *Juncaceae* have a small presence and *Fabaceae*, valuable species in terms of fodder, have a percentage of 3.37%. Species from other botanical families occurred in a proportion of 41.34%. From constancy point of view, most species are accidental and only three of them are dominant. This type of grassland has a mesophilic, micro-mesothermal, euriionic character. From agronomic point of view, predominate species medium resistant to mowing and in terms of plant resistance to grazing, most of the species are sensitive to grazing environment and medium resistance to stepping. This is due to the improper agricultural practices and lack of pasture improvement works. The bonitation coefficients indicate that this is a medium category type of pasture with a pastoral value of 1.9 points and supports a load of 0.81 to 1.00 LU/ha.

Keywords: *agronomic factors, ecological response, grazing, plant resistance.*

INTRODUCTION

Natural grasslands have a particular importance in the existence and global balance of the ecosystem (Huygens *et al.*, 2013). In some regions, in order to protect natural areas, they tried to eliminate the traditional grazing activities; this approach has proved to be ineffective according to Verdu *et al.*, (2000), sheep and goats controlled grazing can maintain the ecosystems biodiversity. Grazing activities have been associated to the sustenance of biodiversity in different ecosystems, because by controlling the mutual interaction of

two factors - plant and animal – may be obtained good economic resulting feedback. Biodiversity of natural grasslands is highly important in terms of fodder, as it significantly increases the yield.

As the hilly pastures are dominantly covered by *Agrostis capillaris* and *Festuca*, they are used as pastures, grasslands and as a mix of them; they are used extensively and sometimes with a medium intensity due to the grassy carpet covered by spontaneous rural species and due to the pedoclimatic conditions (Marusca *et al.*, 2010). In general, extensive meadows and pastures are less

productive and give crop with a lower net energy content compared to those managed intensively (Metera *et al.*, 2010).

Agricultural practices undertaken on natural meadows in the village Surdesti were held without monitoring the quality of the grassy carpet. For this reason this work has tried to describe the characters of pastures covered by *Agrostis capillaris* L. and *Festuca rubra* L. we shall describe the species, tracking their behaviour due to ecological factors, namely their classification in terms of their response to the agronomic factors.

Our analysis made obvious the way the agricultural practices undertaken over time, without regard to any rule, influenced the evolution of vegetation and on this basis we recommend measures to be taken to improve pasture management.

MATERIALS AND METHODS

The study conducted and presented in this paper is based on observations and analyzes conducted during 2012 – 2014, on the pasture of Surdesti village (known under the local name „Dealul Crucii”), Maramures County (Fig.1). This meadow is being used in a mixed way and it is located 700 meters high.

The floristic composition was studied with Bran-Blanquet method, by making phytosociological relevés (samples surface). Phyto-sociologic indexes mean abundance-

dominance (ADm) and constancy (K) have been calculated using the statistics –mathematics method (Cristea *et al.*, 2004).

The species were analyzed in terms of ecological indicators related to soil moisture, temperature and soil reaction according to the speciality bibliography. Plant resistance to mowing, grazing and stepping were embodied through indicator values (from 1 to 9) by Dierschke and Briemle (2002).

RESULTS AND DISCUSSIONS

In the hills areas, the pastures and the meadows are specific elements of the landscape; it is the habitat for many species of plants and animals. Agricultural practices undertaken by inhabitants on such lands are mainly grazing and mowing in order to feed animals. In Maramures County, meadows are mostly covered by *Agrostis capillaris* and *Festuca rubra* (Barbos, 2006) and the „Dealul Crucii” meadow, Șurdești village, the species is found in a significant proportion.

The grassland of *Agrostis capillaris* L. - *Festuca rubra* L. has a floristic composition comprised of *Poaceae* (45.85%), where the *Agrostis capillaris* L. species is noticed with 18 % and *Festuca rubra* L. is present at a rate of 15.93%. Besides these dominant species of *Poaceae*, there are the indicator species as follows *Anthoxanthum odoratum* L., *Festuca pratensis* Huds, *Cynosurus cristatus* L. and accessory species as *Dactylis glomerata* L., *Briza media* L. Species from *Cyperaceae* and *Juncaceae* have a very reduced cover, with a ADm of 0.5%. Representatives of these botanical families *Carex pullescens*, *Juncus effusus*, *Luzula campestris*, are considered accidental species, given that the land has a slope of 5-10% and thin soil water retention is not achieved (Bogdan *et al.*, 2011). The *Fabaceae* are most valuable in terms of fodder are present in a proportion of 3.37%, and the dominant species are *Lotus corniculatus* L. Plants from other botanical families are present with a ADm of 41.34%, of which with significant presence are *Centaurea phrygia* L., *Achillea millefolium* L., *Pteridium aquilinum* L., *Thymus serpyllum* L. There are also species such as *Urtica dioica* L. and *Rumex crispus* L. which indicate a longer beyond the limit stay of the animals on the same spot during pasturing time (Tab. 1).

To highlight the degree of fidelity of the species in the meadow covered by *Agrostis capillaris*

Fig. 1. Satellite image of the experience (<http://maps.google.com>, june 2014)

- *Festuca rubra* we have calculated individuals constancy in the sample areas analyzed; thus it was found that 17 species are accidental, 9 species are accompanying ones, 8 are indicator species, 4 species are frequent, 3 species are dominant (Fig.2). There is a decrease in the number of species from the lower frequency classes to the higher classes. The trend is easily predictable and obvious, given the conditions when the biotop's limited resources maintain the abundance of most of the species at a relatively low level in behalf of

dominant species and good competitors (Rotar *et al.*, 2014).

Regarding the agronomic value of grasslands, indicate that this is a medium category type of pasture with a pastoral value of 1.9 points and supports a load of 0.81 to 1.00 LU/ha.

Regarding the ecological response of plant species growing on the lawn of the "Dealul Crucii", we have found that the following species: mesophilic, micromezoterme and the euriionic ones are predominant, according to the climatic conditions of the area of research.

Tab. 1. Species composition and assessment of the *Agrostis capillaris* - *Festuca rubra* grassland type

Floristic composition	Ecological indexes			Agronomical indexes			ADm	K
	U	T	R	MR	GR	STR		
Poaceae							45.85	
<i>Agrostis capillaris</i>	x	x	4	6	5	5	18	5
<i>Anthoxanthum odoratum</i>	x	x	5	7	5	5	4.25	4
<i>Briza media</i>	x	x	x	4	4	4	0.12	1
<i>Cynosurus cristatus</i>	3	3	3	7	7	7	1.81	3
<i>Dactylis glomerata</i>	5	x	x	8	4	6	0.67	2
<i>Festuca pratensis</i>	6	x	x	6	4	6	5.07	3
<i>Festuca rubra</i>	5	x	x	9	7	6	15.93	5
Cyperaceae/Juncaceae							0.5	
<i>Carex pullescens</i>	x	4	4	4	5	5	0.25	1
<i>Juncus effusus</i>	7	5	4	4	7	6	0.12	1
<i>Luzula campestris</i>	4	x	3	5	5	5	0.12	1
Fabaceae							3.37	
<i>Lotus corniculatus</i>	4	x	7	6	4	4	2.25	4
<i>Trifolium repens</i>	5	x	6	8	8	8	0.75	2
<i>Trifolium pratense</i>	x	x	x	7	4	4	0.12	1
<i>Medicago lupulina</i>	2.5	3	4	6	4	5	0.25	2
Species from other botanical families							41.34	
<i>Achillea millefolium</i>	4	x	x	7	4	5	3.75	5
<i>Campanula patula</i>	5	6	7	5	2	2	0.81	3
<i>Centaurea phrygia</i>	5	4	5	5	2	2	3.97	4
<i>Chrysanthemum leucanthemum</i>	4	x	x	6	3	4	2.60	3
<i>Cirsium vulgare</i>	5	5	8	-	-	-	0.12	1
<i>Fragaria vesca</i>	5	x	x	-	-	-	0.12	1
<i>Galium aparine</i>	4	5	5	4	4	4	0.18	1
<i>Galium mollugo</i>	4	6	7	5	4	4	1.67	2
<i>Hypericum maculatum</i>	6	x	3	3	3	3	2.85	3
<i>Pimpinella saxifraga</i>	2	x	3	5	3	2	2.25	1
<i>Plantago lanceolata</i>	x	x	x	7	6	6	2.31	3
<i>Polygala vulgaris</i>	5	x	3	4	4	4	1.25	2

Tab. 1. Species composition and assessment of the *Agrostis capillaris* - *Festuca rubra* grassland type - continued

Floristic composition	Ecological indexes			Agronomical indexes			ADm	K
	U	T	R	MR	GR	STR		
<i>Species from other botanical families</i>							41.34	
Potentilla erecta	x	x	x	8	4	5	0,25	1
Pteridium aquilinum	x	x	x	8	6	6	3,65	2
Ranunculus auricomus	x	x	x	2	2	3	1,87	2
Rhinanthus minor	x	5	x	5	8	3	2,25	4
Rumex acetosa	x	x	x	6	4	2	1,12	1
Rumex acetosela	2	3	2	6	4	2	0,67	1
Rumex crispus	4	x	x	7	7	7	2,25	2
Scabiosa ochroleuca	3	5	6	5	3	4	0,12	1
Stellaria graminea	4	x	4	4	5	5	0,45	2
Taraxacum officinale	5	x	x	8	7	7	1,81	3
Thymus serpyllum	4	x	x	4	4	4	3,11	3
Urtica dioica	x	x	x	5	4	4	0,67	1
Vaccinium myrtillus	5	x	x	2	3	2	0,12	1
Veronica chamaedrys	5	x	x	7	6	6	0,87	1
Viola arvensis	4	x	3	4	2	2	0,25	1

U-humidity, T-temperature, R-soil reaction, MR-Resistant to mowing, GR-Resistant to grazing, STR-Resistant to stepping, ADm = mean abundance-dominance, K = constancy.

Fig. 2. Distribution on constancy classes of *Agrostis capillaris* L. - *Festuca rubra* L.

Given that each year the meadow is subject to agronomic works, such as mowing and grazing, we have examined the plant resistance mowing, resistance to grazing and resistance to stepping. Regarding plant resistance to mowing, we found that 15 species are medium resistant, 12 resistant, 9 are medium sensitive, 2 species susceptible and 1 extremely resistant. The study of the grazing resistant species of plants, demonstrated that 20 species are medium sensitive to grazing environment, 9 species are medium resistant,

6 species are resistant to grazing, 4 species are sensitive to grazing. Regarding resistance to stepping, noted a number of 15 species medium resistance, 13 species medium sensitive to stepping, 7 species susceptible and 4 species resistant. The largest coverage on grassland of *Agrostis capillaris* L. - *Festuca rubra* L. from „Dealul Crucii” meadow have species resistant to mowing, being used in an extensive to medium intensive system, grazing sensitive environmental species, which denote the environment sensitive to pasture grazing and medium resistance to stepping.

CONCLUSION

Our analysis of the “Dealul Crucii” vegetation-Surdesti village has identified a meadow mainly covered by *Agrostis capillaris* L. - *Festuca rubra* L. with an average agronomic value following an extensive management. From the point of the ecological indices, this type of meadow is mesophilic, micro mezotherme and eurionomic.

The influence of agronomic works on the grassy carpet indicates a decrease in species resistant to grazing, and those medium sensitive are predominant. The plant species medium

resistant to mowing and medium resistance to stepping are more frequent.

Thus, it must be given a greater attention to the methods of the land use and to the methods meant to improve the meadow output in order to obtain favourable results.

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