

APPROACHES ON THE DYNAMICS OF THE FLORISTIC COMPOSITION OF A BANAT HILL GRASSLAND (WESTERN ROMANIA)

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ABSTRACT

*In Romania, most hill grasslands are improperly managed, being either occasionally grazed or abandoned. From this perspective, the goal of the present paper was to monitor the dynamics of the floristic composition, of the pastoral value and of biodiversity under different management conditions. The permanent grassland we analysed is one in which dominant species have been *Agrostiscapillaris* L. and *Anthoxantumodoratum* L. Observations were carried out for five years (2008-2012) on five permanent plots mowed twice a year in 2008 and 2009, and mowed once and occasionally grazed by sheep in 2010, 2011 and 2012. Sampling was done with the linear method which allowed the calculus of some parameters such as specific contribution (SC%), pastoral value (PV) and Shannon-Weaver diversity index. The statistic method used was correlation analysis. Results show that occasional grazing by sheep in the last three years had a significant impact on the analysed parameters.*

INTRODUCTION

Permanent grasslands are an important source of feed for animals and play an important role ecologically. In Romania, the hill and mountain area, starting from 200 m and up to 1200 m altitude, from the oak and sessile oak subarea up to the European beech and European beech and resinous mixture subarea, are covered by grasslands of *Agrostiscapillaris* L. which have a good productivity when located on plane or slightly inclined areas, a state that can be maintained with a proper management. In Europe, mowing is the traditional method of managing permanent grasslands and the most frequently used one in haymaking fields where there is no grazing (Gibson D, 2009). In the last two decades, in Romania and in other European countries as well, the number of herbivores using permanent grasslands has decreased dramatically (Sarateanu V. 2008), and grazing has become rather occasional (Durau C.C. *et.al.* 2009). From this perspective, monitoring the dynamics of floristic composition and of agro-ecological value in this type of grassland has become one of the priorities for agronomists and biologists in the field.

MATERIAL AND METHODS

The study was carried out between 2008 and 2012 on permanent grassland dominated by the species *Agrostiscapillaris*L and *Anthoxantumodoratum* L. The permanent grassland analysed is located at the foot of the PoianaRusca Mountains (Western Romania). Between the mountain and the hill areas, there is the analysed permanent grassland in the Fârdea-Hăuzești Depression. The altitude is 282 m, and geographical coordinates are 45°41'50 N and 22°09'40 E. From a management point of view, we can say that in 2008 and 2009, the grassland was mowed twice a year and in 2011 and 2012, it was mowed once and occasionally grazed by sheep. Observations were made on five permanent plots measuring 5mx5m each, using the linear method (Daget and Poissonet, 1971). We, thus, monitored different parameters of vegetation: specific species contribution (SC%), pastoral value (PV), Shannon-Weaver index (*H'*). Results represent the mean of these data. The statistic method used is correlation analysis.

Abbreviations used below: gramineae (GRA), legumes (FABA), cyperaceae and juncaceae (CYPJU), plants from other botanical families (PAF).

RESULTS AND DISCUSSION

The sampling during the five years of study showed that the species with the highest specific contribution (SC%) were *Agrostiscapillaris* L. and *Anthoxantumodoratum* L., which ranged the grassland analysed among the *Anthoxantho – Agrostietumcapillaris* Silinger 1933, Jurko 1969 association. To also note the gramineae and legumes with high fodder value such as *Cynosurus cristatus* L., *Festuca pratensis* Huds., *Lotus corniculatus* L., *Trifolium repens* L. The changes in intensity and timing of mowing and the impact of grazing had an influence on species (SC%) with significant changes in high fodder value species. Thus, there were high differences in (SC%) in the species *Festuca pratensis* Huds., – from 7.58% (2008) to 1.36% (2012), *Cynosurus cristatus* L. and, among legumes, *Trifolium repens* L. 5.51% (2008) to 0.68% (2012). All these changes in (SC%) caused by the removal of the second mow and by its replacing with sheep grazing reflect in the dynamics of PV and H' . Knowing all these factors impacting floristic composition and species abundance on a permanent grassland is the key to understanding productivity, fodder quality and successful management (Scellberg J., et al. 2012).

To point out this aspect, we established correlations between specific contribution of gramineae, legumes, cyperaceae-juncaceae and of plants from other botanical families and PV and H' , respectively, Table 1.

Table 1

Correlation coefficients (r) between different vegetation parameters

Specification	GRA (CS%)	FABA (CS%)	CYPJU (CS%)	PAF (CS%)	PV	H'
GRA(CS%)	1	0,02	0,55*	-0,84***	0,15	0,53*
FABA(CS%)		1	0,74**	-0,55*	0,75**	-0,68**
CYPJU(CS%)			1	-0,87***	0,39	-0,73**
PAF(CS%)				1	-0,52*	0,81***
PV					1	-0,86***

Significant correlations ($r = 0.55$, $r = 0.53$) have been established between GRA (SC%), CYPJU (SC%), and GRA (SC%) and the Shannon-Weaver index (H'). There were no correlations between GRA (SC%) and pastoral value (PV): this can be explained by the fact that GRA (SC%) increased year after year, the grassland got more gramineae with much lower fodder value such as *Holcus lannatus* L., *Festuca rupicola* L.. Between SC% of FABA and PV there was a distinctly positive significant correlation ($r=0.75$).

To increase phytodiversity, grazing was a superior management solution than mowing because it is selective and because it was stepped and enriched through faeces (Wrage N. et al. 2011). This is how we can explain the very significant positive correlation ($r = 0.81$) between PAF (CS%) and H' . To also mention that in the grassy cover we found new species such as *Rynanthus minor* L., *Stachys germanica* L., *Knautia arvensis* (L.) Coulter, *Hyericum perforatum* L. whose SC% resulted in a decrease of the pastoral value and in an ascending evolution of the Shannon-Weaver diversity index (H'), which is also emphasised by the very significantly negative correlation between PV and H' ($r=-0.86$).

Mowing can also affect the development of some species (Gibson D., 2009). In this aspect, we can say that, in 2011 and 2012, we could identify the presence of the species *Muscari comosum* L., after we replaced the second mowing by sheep grazing. Therefore, mowing becomes performing when species have already reproduced or shed their seeds (Eisto A-K, et al 2000).

CONCLUSIONS

Analysis of correlations show there are very significantly negative correlations between the specific contribution of gramineae and that of plants from other botanical families. Specific contributions of legumes has a significant impact on pastoral value ($r=0.75$), and biodiversity is correlated very significantly positively with the specific contribution of the plants from other botanical families. Understanding the dynamics of species that dominate management practices allow predictions concerning the re-establishment of fodder value species on permanent grasslands.

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