

Study of the Floristic Biodiversity Available on Permanent Pastures Located at Different Altitude Levels

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Abstract

The researches carried out between the altitude levels of 236 and 1300 m, in 13 localities from Banat Mountains, proved the influence exerted by stationary natural conditions on the botanic diversity of the vegetal cover. From one vegetal association to another, the total number of botanic species ranged between 9 and 21; the biggest number of species was recorded between 236 – 630 m altitude, and the smallest one between 462 – 650 m. The mean coverage degree of these species was 42.69% in the species belonging to the *Poaceae* Family (with a variation of 30-70%) and 12.85% in the species belonging to the *Fabaceae* Family (variation of 25-65%).

Keywords: altitude, botanic composition, permanent pasture.

1. Introduction

The altitude, due to the great complexity of stationary natural factors, plays an important role in permanent pastures' biodiversity and vegetation. These factors, which act differently along one altitude level, influence the adaptation degree of the botanic species within the vegetal cover, reflected through the participation percentage and the diversity degree of the pasture association [1 - 5].

This work presents the dimension of the floristic structures' diversity degree, in some of the permanent pastures located at altitudes between 236 – 1300 m.

2. Materials and methods

The researches were performed during 2005 - 2009 on some permanent pastures located between the altitude limits of 236 – 1300 m, in Banat's

Mountains, in 13 localities. In each perimeter, we delimited a representative area of 200 m² with fix fence; in this area, we performed our floristic-nature observations and determinations on the vegetal cover.

To assess the vegetal cover's biodiversity, in the permanent pastures studied, on the altitude levels mentioned above, we carried out the following determinations:

- Botanic identification of the species present in the area analyzed;
- Recording of the number of individuals belonging to each species;
- Frequency and specific contribution;
- Calculation of biodiversity distribution indices (Simpson index, Shannon – Weaver index, equity index).

3. Results and discussion

Successive to the floristic studies performed, we observed that the botanic species studied belong to a reduced number of botanic families, namely: *Poaceae*, *Fabaceae*, *Rosaceae*, *Asteraceae*,

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Scrophulariaceae, Cyperaceae, Lamiaceae. The most of these species belong to the group of therophytes and this indicates a high-degree vegetal cover weeding and a relatively reduced number of hemicryptophyte species, specific for the pasture vegetation. Also, between the altitude levels studied, we did not observe any endemic species, but we predominantly observed cosmopolite and adventive species, some of them characterized by extension (*Urtica dioica*, *Ambrosia artemisiifolia*).

The number of botanic species grouped in the Families Poaceae and Fabaceae, the most important ones for pasture vegetation, are much differentiated from one altitude level to another (Figure 1.). From one vegetal association to another, the total number of botanic species ranged between 9 and 21. Of these, the biggest number of species was recorded at the altitudes of 236 m (21 species) and 630 m (19 species), and the most reduced number at the altitudes of 462 m (9 species) and 650 m (9 species).

In the case of the most important botanic families, in terms of nutritional value, the number of species ranged between 2 – 4 per association in the Family Poaceae (with a mean of 2.69), between 1 – 3 in the Family Fabaceae (the mean 1.85 / association) and between 5 – 16 species in the group Other botanic families, respectively with a mean of 10.15 species/association (Table 1.).

The covering degree was 42.69% in the species belonging to the Family Poaceae (with a variation of 30 – 70% along the altitude level studied), 12.85% in the Family Fabaceae (variation between 1 and 31%) and 44.46% in the species belonging to Other botanic families (variation of 25 – 26%).

The determination of the variability coefficients proves the high-degree variation of the number of species and of the covering degree: between 31 – 47% for the number of species and between 26 – 79% for the covering degree.

The highest participation proportion of the species belonging to the Family Poaceae, of 42 – 72%, was recorded in the lowest region of this altitudinal level (between 236 – 462 m), and the most reduced one, of 30 – 44%, between the altitude limits of 470 – 1300 m (Figure 2). In the case of the Family Fabaceae, we observed a slight participation percentage increase between 236 – 650 m altitude (participation between 5 – 27%), a decrease between the altitude limits 650 – 930 m of up to 1% and a remarkable increase between

930 and 1300 m (with a participation of 10 – 31%).

The researches in the field of natural vegetal biodiversity classify this diversity type in 4 levels: genetic or intra-specific diversity, specific diversity, ecologic diversity and landscape or spatial diversity. Each diversity type is influenced by numerous environmental gradients: climatic and orographic factors, ecosystem's productivity, altitude and latitude, etc. These factors may determine the increase of diversity or limit the increase of the number of individuals in a population.

According to the data representing the biodiversity evaluation, interpreted through the determination of the specific biodiversity indices, we may conclude that the permanent pastures studied, located between the altitude limits of 236 – 1300 m, are characterized by a reduced vegetation diversity, with a relatively reduced number of species.

The biodiversity Shannon – Weaver index, which expresses the structural complexity of pasture vegetal associations by reporting to the number of species and their abundance, has values of 2.30 – 3.41, proving that the pastures studied present a reduced to medium vegetal diversity (Table 2). The pastures studied between the altitude limits of 700 – 1300 m present higher biodiversity indices, respectively a bigger number of species. Between the altitude limits of 400 – 650 m, this index presents values of 2.30 – 2.51, namely pastures with reduced vegetation diversity.

The values calculated for the Simpson index indicate a very reduced diversity on the pastures located at the altitudes of 400 m ($D = 0.29$) and 650 m ($D = 0.58$). This index is calculated with the stationary conditions, which strongly influence the number of species on pastures and their proportion.

The equity index calculated proves that the proportions that represent the species are more balanced. The limits of this index, comprised between 0.32 – 0.93, show that the pastures present a relatively reduced abundance of species, with a variable number of individuals from each species.

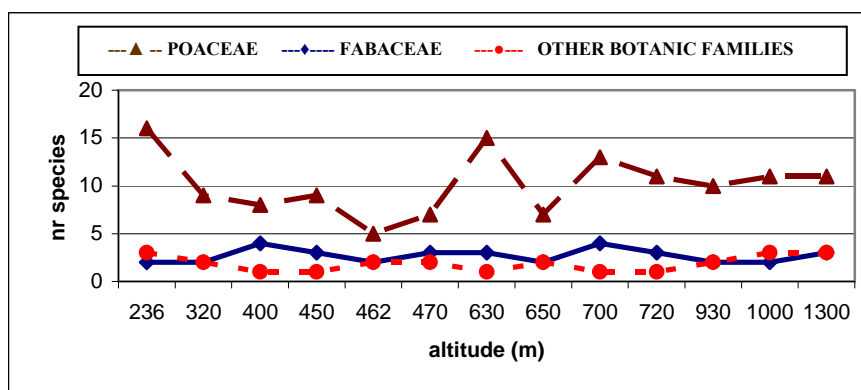


Figure 1. Variation of the number of species in Poaceae, Fabaceae and other botanic families, between the altitude limits of 236 – 1300 m

Table 1 Statistical indices for the assessment of floristic structure’s variability degree in the vegetal cover

		No. Obs.	Mean	min	max	Standard deviation	Cv (%)
Altitude (m)		13	636.00	236.00	1300.00	299.89	47
POACEAE	No. of species	13	2.69	2.00	4.00	0.75	28
	Covering degree %	13	42.69	30.00	72.00	11.47	27
FABACEAE	No. of species	13	1.85	1.00	3.00	0.80	43
	Covering degree %	13	12.85	1.00	31.00	10.11	79
OTHER FAMILIES	No. of species	13	10.15	5.00	16.00	3.18	31
	Covering degree %	13	44.46	25.00	65.00	11.61	26

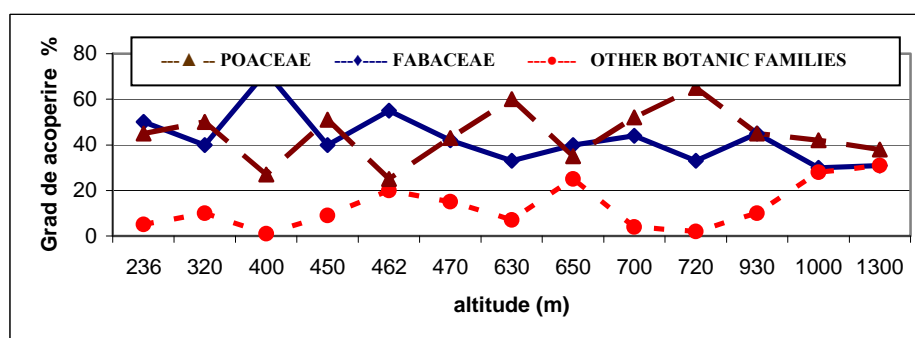


Figure 2. Variation of the participation percentage in Poaceae, Fabaceae and Other botanic families, between the altitude limits 236 – 1300 m

Table 2. Calculation of the main indices of vegetal cover’s biodiversity, on the permanent pastures located between the altitude levels of 236 – 1300 m

Locality	Altitude	Shanon – Wiever index (H)	Simpson index (D)	Equity index (E)
Păltiniș	236 m	3,41	0,12	0,69
Bolvașnița	320 m	2,86	0,06	0,54
Iaz	400 m	0,48	0,29	0,32
Turnu Ruieni	450 m	2,51	0,06	0,87
Marga	462 m	2,49	0,06	0,83
Buchini	470 m	3,33	0,09	0,93
Băuțar	630 m	2,37	0,04	0,91
Var	650 m	0,30	0,58	0,34
Sălbăgelul Nou	700 m	3,39	0,04	0,88
Iepura	720 m	3,38	0,05	0,73
Brebu	930 m	2,91	0,05	0,62
Zăvoi	1000 m	3,33	0,07	0,53
Poiana Mărului	1300 m	2,93	0,04	0,51

4. Conclusions

The stationary conditions specific to the altitude studied influence the degree of adaptation of the botanic species from the vegetal cover, reflected on their participation percentage and on the biodiversity degree of the pasture association, revealing big differences between the altitude limits studied.

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