RESEARCHES CONCERNING THE FLORAL COMPOSITION AND GRAZING VALUE OF AN *AGROSTIS TENUIS-FESTUCA RUBRA* PASTURE, FROM VÂNĂTORI-NEAMȚ NATURAL PARK

C. Grozavu[1], I.M. Pop[2], Cristina Gabriela Radu-Rusu[2]

[1]*Management Authority of the Operational Regional Program –
Ministry of Regional Development and Tourism*
[2]*University of Agricultural Sciences and Veterinary Medicine Iaşi*
e-mail: cezar.grozavu@mdrl.ro

Abstract

The pastures from the range of Vânători Neamț Natural Park, which belongs to Tg. Neamț Forestry Office, are comprised in the nemoral level, especially in the sub-section represented birch forests and mixture of birch with coniferous species. Small participation is represented by the pastures from watersides and depressions (especially the Lolium perene–Trifolium repens and Festuca pratensis – Poa pratensis types). In the studied area, the Agrostis tenuis-Festuca rubra spontaneous pasture was considered as representative. Relatively to its floral composition, assessed through the double meter method, several botanic families have been identified, containing a various amount of species: Gramineae (12 taxons)-specific contribution=92.96%, Leguminosa (4 taxons)-specific contribution=3.38% and Different other plants (12 taxons)-specific contribution=3.66%. Through the usage of data related to specific contribution and quality index for the species identified in Agrostis tenuis – Festuca rubra pasture, the final score of the grazing value was achieved, respectively 51.77. Thus, the edge value of 50% from the pasture classifying referential has been passed. The calculation of grazing capacity revealed a value of 1.29 UVM/ha. These data allowed us to classify the pasture in the IInd quality class: "GOOD". The vegetal mass from the studied pasture could be successfully used in the feeding of bison from Vânători-Neamț, through grazing or harvesting and giving at mangers during summer time or as hay, during cold season.

Key words: pasture, *Agrostis tenuis, Festuca Rubra*, grazing value, bison

INTRODUCTION

The European researches, especially those focusing on ruminal physiology found that European bison diet is usually composed of grasses, sedges, hay (90% of rumen volume) while other vegetation sources (trees, bushes) reach the 7-13 %. A comparative analysis was followed within our experiments, in order to assess the feed resources from Vânători-Neamț park forestry area.

MATERIAL AND METHODS

An identification of pasture botanical composition is needed to calculate the pastoral value. The specific methods are named the double linear metering or the geobotanic methods and were recommended by certain authors [9, 13]. We used the double linear metering method, which comprises the notifying of any vegetal species occurring in 100 points across a double meter. Readings have been done at each 4 cm, during 2 repetitions. The sum of points where any plant could occur represents the *specific frequency,* and could range from 0 to 100 [3, 4]. *Specific contribution* (specific abundance) is given by the percentage ratio between specific frequency and the sum of specific frequencies which characterize the species found in 100 spots, according to the mathematical relation:

$$C.s.(\%) = \frac{F.s.}{\sum F.s} \times 100 \text{, in which:}$$

C.s. = specific contribution; F.s. = specific frequency; Σ F.s. = sum of specific frequencies.

Feeding value of species from pasture is expressed through the *specific quality index (I.s.)*, which is granted in accordance with the table 1 details.

Table 1 – Correlation between specific quality index and feeding value of botanic species
(*Vîntu et al., 1995, 2001, 2002*)

Specific quality index (S.I.)	Feeding value	Representative species
5	Excellent	*Phleum pratense, Festuca pratensis, Dactylis glomerata, Lolium multiflorum, Medicago sativa, Lolium perene* etc.
4	Very high	*Poa pratensis, Medicago lupulina, Trifolium repens, Trifolium pratense* etc.
3	Good	*Agrostis capillaris, Festuca rubra, Festuca nigrescens, Lotus corniculatus, Poa alpina* etc.
2	Average	*Alchemilla vulgaris, Phleum montanum, Poa annua, Plantago lanceolata, Plantago major, Plantago media, Trifolium montanum, Taraxacum officinale* etc.
1	Mediocre	*Briza media, Festuca ovina, Anthoxanthum odoratum, Potentilla erecta* etc.
0	Without value	*Nardus stricta, Deschampsia caespitosa, Deschampsia flexuosa, Carex leporina, Vaccinium myrtillus, Equisetum arvense* etc.

This index (Is) essentially refers to the organic and mineral nutrients from plants, to their nutritional and biological value, to their palatability. It is expressed through grades from 0 la 5. Those species receiving an 1 to 5 quotation could be considered for feeding usage [1, 2]. *Pastoral value (V.p.)* computation, for any studied pasture is done through the data issued from specific contribution and specific quality index calculation, in accordance with the relation below [7].

$$VP = \sum_{i=1}^{n} (CS_i x IS_i)/5,$$ in which CS_i – estimation of specific contribution through the specific volume; IS_i - specific index; i – species; n – species amount; 5 – maximum possible grade

Pastoral value (V.p.) calculation is requested in order to asses the *grazing capacity (C.p)*, which could be obtained through the relation below [5, 6].

C.p. = V.p. X c (UVM/ha), in which c represents a coefficient which could range from 0.02 to 0.03 for the pastoral value calculated through double linear metering.

Assessment of permanent pasture production potential and quality could be done using the *Specific contribution (C.s.)* and *Grazing capacity (C.p)* values, as presented in table 2.

Table 2 – Assessment of pasture productivity and quality, in accordance with the pastoral value (V.p.) (*Iacob et al., 2004*)

Pastoral value (V.p.). evaluated through the double metering method	Grazing capacity (C.p) (UVM / ha) for permanent pastures	Pasture classifying
75-100	> 2-3	Very good
50-75	1 – 2	Good
25-50	0.5 – 1	Average
5-25	0.2 – 0.5	Poor
< 5	< 0.2	Degraded

RESULTS AND DISCUSSIONS

The studied ecosystem was defined across the entire area of the Tg. Neamţ Forestry Authority domains (10548.2 ha) and particularly at the Vânători Neamţ park level

("Dragoş Vodă" Tg. Neamţ Bison reserve - 4 ha).

Through their geographic placement, these domains are comprised within the small mountains and hills region. Field energy is more pronounced in the Western side, where forests reached 80%, while in the hilly area, forests did not pass over 45%. Therefore, the area is specialized in forestry. The boundaries of this forestry domain are either natural or artificial. In the Western side, the forests are mixed with other ones from neighbor domains: Văratec, Pipirig and Râşca. The other neighborhoods in the hilly area are represented by agricultural fields, as plowing plots, meadows and pastures. Vânători Neamţ reserve is under the authority of Vânători Neamţ Natural Park adminsitration, included within the Tg. Neamţ forestry authority. Certain data from the forestry recordings during 1963 – 2007 were used, in order to express the dynamics of surfaces covered by pastures (fig. 1) on the Tg. Neamţ forestry authority domains.
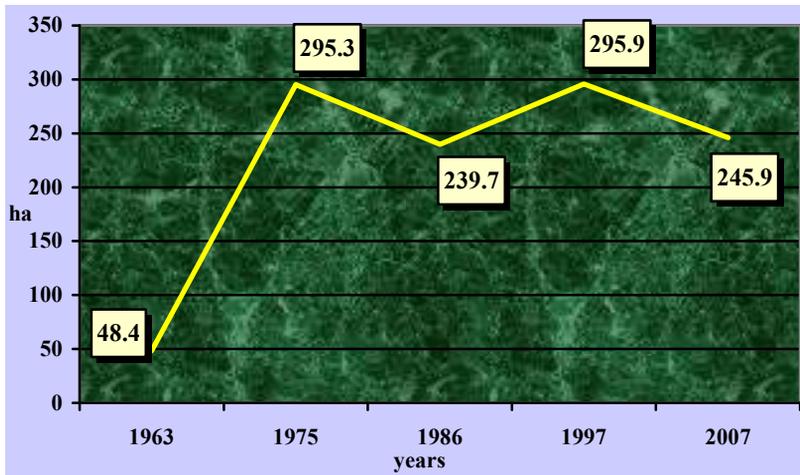

Fig. 1 – Dynamics of pastures surfaces across the Tg. Neamţ Forestry Office area

Fig. 1 indicates an increase of pastures surface as a result of field fragmentation, due to certain human factors (massive tree harvests, selective harvests, forest injuries through fire or natural climate factors, changes in forests botanic composition etc.).

Identification and characterization of the main feeding resources from Vânători Neamţ Park, were realized through the analysis of the pastures comprised within the Tg. Neamţ Forestry Authority domains.

The pastures from the Vânători Neamţ Natural Park were considered to be part of the nemoral level, especially of the birch tree and of birch tree-coniferous mixture sublevels (especially the *Agrostis tenuis – Festuca rubra* type). Reduced proportion was given by the pastures in meadows and depressions (epecially of *Lolium perenne–* *Trifolium repens* and *Festuca pratensis–Poa pratensis* type).

In Vânători-Neamţ park, the spontaneous permanent pasture of *Agrostis tenuis-Festuca rubra* type was considered representative. Within its floral composition, assessed through double linear metering, several botanic families were identified, each one comprising variable species amount: *gramineae* (12 taxons), *leguminosa* (4 taxons) and *diverse other plants* (12 taxons) (table 3).

Concerning the specific contribution, it was found that Gramineae family reached the most significant participation level (92.96%). From the 12 identified species, two of them were predominant: *Agrostis tenuis* (25.07% in pasture) and *Festuca rubra* (23.10% in pasture). The other species belonging to this

botanic family variably contributed in floral cover composition, from 0.56% (*Phleum pratense*) till 16.62% (*Festuca rupicola*). Other species with high specific quality index of (Is) were identified under 5%, while certain species without feeding value (*eg.*

Nardus stricta) were found in quite high proportions (env. 15%). Both dominant gramineae species, which named the pasture type, presented intermediate feeding value (Is=3) (table 3).

Table 3- Floral composition, pastoral value and grazing capacity of the *Agrostis tenuis – Festuca rubra* permanent pasture, from Vânători-Neamţ natural Park

Species	Specific frequency (n)	Specific contribution (Cs) (%)	Specific quality index (Is)	Pastoral value (Vp)	Grazing capacity (Cp) (UVM/ha)
Gramineae (12 species)	330	92.96		243.10	
Agrostis tenuis	89	25.07	3	75.21	
Festuca rubra	82	23.10	3	69.30	
Festuca rupicola	59	16.62	3	49.86	
Nardus stricta	54	15.21	0	0.00	
Cynosurus cristatus	42	11.83	3	35.49	
Poa pratensis	31	8.73	4	34.93	
Festuca pseudoovina	24	6.76	1	6.76	
Dactylis glomerata	15	4.23	5	21.13	
Festuca pratensis	9	2.54	5	12.68	
Agrostis rupestris	7	1.97	3	5.92	
Poa media	5	1.41	3	4.23	
Phleum pretense	2	0.56	5	2.82	
Legumes (4	12	3.38		12.96	
Trifolium pratense	5	1.41	4	5.63	
Trifolium repens	3	0.85	4	3.38	
Medicago falcata	2	0.56	4	2.25	
Lotus corniculatus	2	0.56	3	1.69	
Diverse plants (12 species)	13	3.66		2.82	**1.29**
Arnica montana	1	0.28	1	0.28	
Viola declinata	1	0.28	0	0.00	
Achilea millefolium	1	0.28	0	0.00	
Alchemilla vulgaris	1	0.28	2	0.56	
Potentilla reptans	1	0.28	1	0.28	
Plantago lanceolata	2	0.56	2	1.13	
Equisetum arvense	1	0.28	0	0.00	
Capsella bursa pastoris	1	0.28	0	0.00	
Prunella vulgaris	1	0.28	0	0.00	
Urtica dioica	1	0.28	0	0.00	
Rubus hirtus	2	0.56	1	0.56	
Ranunculus acer	1	0.28	0	0.00	
		100.00		**51.77 Value "GOOD"**	

Legumes participated just 3.38% in pasture formation, the most significant species being represented by clover ones (*Trifolium pratense*-1.41% and *Trifolium repens*-0.85%). Leguminous species had good and very good feeding value, contributing thus to pastoral value increasing.

Floral composition of the studied pasture comprised also diverse plant species (3.66%), the most occurring ones being represented by *Plantago lanceolata* (0.56%) and *Rubus hirtus* (0.56%) specimens. The species in this category does not have feeding value or have a very poor one. Therefore they negatively affect the pastoral value of the floral cover,

especially when they are found in high amount.

Through the combination of specific contribution and quality index data issued from *Agrostis tenuis – Festuca rubra* pasture analysis, the final score was obtained. It reached 51.77%, the 50% margin value being thus overrun. Grazing capacity computation revealed a value of 1.29 UVM/ha. These data imposed us to classify the pasture as belonging in the IInd quality class: "GOOD" pasture.

However, the achieved grade could be improved, through the increase of those species presenting very good feeding value (gramineae and legumes with 4 and 5 quality indexes) and through the decrease of those species with very poor or without feeding value (*Nardus stricta*, diverse species). This could be reached through fertilization (sheep grazing and composting) or through agro-technical methods (revitalizing of vegetal layer through reseeding, cultivation etc.), knowing that a certain area form the studied pasture is used in feeding bison from „Dragoş-Vodă" reserve, the feed being used as green mass or hay, during the cold season.

CONCLUSIONS

The ecosystem in Vânători Neamţ Natural Park mostly included forests (80%), thus its pastures are comprised within the nemoral level, represented by birch tree forests or birch trees-coniferous forests sublevels.

The spontaneous permanent pasture of *Agrostis tenuis-Festuca rubra* type was considered representative for the studied park. Several botanic families were identified in its floral composition: *gramineae* (92.96%), *leguminosa* (3.38%) and *diverse other plants* (3.66%).

Pastoral value reached 51.77, which meant a good mark for the studied pasture, while grazing capacity was calculated at 1.29 UVM/ha.

Pasture quality could be also increased through fertilization or agro-technical methods.

REFERENCES

[1] Bârsan A.: Caracterizarea geomorfologică a Carpaţilor româneşti", Lucr. Ştiinţ., I.C.C.P., Măgurele-Braşov, 1995 (9):17-33.

[2] Burcea P., Bărbulescu C.: Supraînsămânţarea păşunilor de *Nardus stricta*, îngrăşate prin târlire", Lucr. Ştiinţ., I.A.N.B., Bucureşti, 1996, vol. VI.

[3] Cardaşol V. ş.a.: Contribuţii la cunoaşterea calităţii furajelor obţinute pe pajiştile naturale, Lucr. Ştiinţ. I.C.C.P. Măgurele-Braşov, 1994 (XVI):229-241

[4] Cardaşol V.: Chaulage et fertilisation azotate dans une essai de longue durée: effet sur la végétation et le sol des prairies, Rev. Technical, FAO, Rome, Italy, 1995, (39):104-105.

[5] Dumitrescu N., Iacob T., Vântu V.: Cultura pajiştilor furajere – Îndrumător de lucrări practice, U.Ş.A.M.V. Iaşi, Lito, 1996.

[6] Dumitrescu N., Iacob T., Vântu V., Samuil C., Trofin Alina: Influenţa fertilizării organo-minerale asupra unei pajişti temporare din Silvostepa Moldovei, Lucr. Ştiinţ. I.C.P.C.P. Măgurele-Braşov, 1997, (XVIII):43-48.

[7] Iacob Th., Vîntu V., Samuil C.: Tehnologia producerii şi conservării furajelor, Editura „Ion Ionescu de la Brad", Iaşi, 2000.

[8] Iacob Th. şi col.: Plante furajere, Editura Pim, Iaşi, 2004.

[9] Popovici D., Chifu T., Ciubotariu C., Mititelu D., Lupaşcu Gh., Davidescu G., Pascal P.: Pajiştile din Bucovina, Editura Helios, Craiova, 1996.

[10] Vîntu V.; Dumitrescu N., Iacob T., Samuil C.: Contribuţii la sporirea biomasei pajiştilor permanente din silvostepa Moldovei, Lucr. Ştiinţ., U.A. Iaşi, Seria Agronomie, 1995, (38).

[11] Vîntu V., Ionel A., Iacob Th. ş.a.: Îmbunătăţirea pajiştilor permanente degradate din silvostepa Moldovei, prin măsuri ale agriculturii biologice, Lucr. Ştiinţ., U.Ş.A.M.V. Iaşi, Seria Agronomie, 2000 (44).

[12] Vîntu V.: Posibilităţi de îmbunătăţire a pajiştilor degradate din depresiunea Jijia-Bahlui, Editura „Ion Ionescu de la Brad", Iaşi, 2002.

[13] Vîntu V., Moisuc A., Motcă Gh., Rotar I.: Cultura pajiştilor şi a plantelor furajere, Editura „Ion Ionescu de la Brad", Iaşi, 2004.