Forage Quality Determined by Botanic Species' Contribution on Permanent Pastures

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Abstract
The chemical composition of the forage obtained from permanent pastures is determined, in its turn, by the floristic structure consisted of species belonging to various botanic families. Each botanic species presents a specific chemical content and a certain contribution to the balancing of forage's nutritional value. The chemical analyses performed, at species level, revealed the importance of the "diverse" species, which, with their content in mineral elements, may influence animals' capacity of production and reproduction. Some of the species, considered to be weeds within the permanent pastures' floristic composition, presented high crude protein content values: *Achillea millefolium* with 24.22%, *Taraxacum officinale* 24.06%, *Urtica dioica* with 32.46%, *Plantago major* with 17.04%, etc.

Keywords: botanic composition, chemical content, permanent pasture.

1. Introduction

Pasture yield quality is conditioned by the nutritive value of the botanic species present in the vegetal cover's floristic composition, which ranges from one pasture type to another, being influenced by the technology applied and by the method of utilization [1]. Also, for many times, the classification of pasture floristic composition in the three groups (Fabaceae, Poaceae, Several plants), according to nutritional value, may be considered to be arbitrary, because there are many situations when forage quality in the permanent pastures is given by the percentage of the species belonging to the group „Several plants".
This work presents the contribution of each botanic species from the floristic structure of some permanent pastures to the achievement of forage.

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2. Materials and methods

The researches were carried out on the permanent pastures from Caraş – Severin County, nearby the locality Păltiniş, at the altitude of 230 m. The determination of the floristic composition was carried out with the gravimetric method; to determine the chemical content, we took plants samples from each species at the beginning of the earring phenophase for gramineae and at the beginning of the blooming phenophase for the other species.
To estimate the influence exerted by each species from the floristic composition to the achievement of forage quality, we determined the relative coefficient (Csr), according to a relationship set by [2]:
$Csr = Ts/Ts^{-}$, where:
Ts = species' content in chemical elements
Ts^{-}= chemical content of the entire association of species

3. Results and discussion

The chemical content of the forage obtained from permanent pastures is determined by the floristic structure, consisted of species belonging to various botanic families. Each botanic species presents a specific chemical composition and certain participation to the balance of the forage nutritional value. Because the percentage represented by legume and gramineae species is lower than the one represented by „miscellaneous", in many pasture types, our researches were directed towards these species, too, which finally play an important role in the definition of pasture quality [3 - 6].

According to the results of chemical analyses, forage chemical content in the case of the association of botanic species is rather balanced (Table 1).

The chemical analyses performed at species level showed the importance of the „miscellaneous" species, which may influence animals' capacity of production and reproduction due to their content in mineral elements. From this point of view, some of the species, considered to be weeds in permanent pastures' floristic composition, presented high crude protein values: *Achillea millefolium* with 24.22 %, *Taraxacum officinale* with 24.06%, *Plantago lanceolata* with 18.29%, *Rumex sp.* with 29.82%, *Urtica dioica* cu 32.46%. Also, as regards the Calcium content, there were „miscellaneous" species that presented similar Calcium content values with the legume species (*Achillea millefolium* with 1.28%, *Urtica dioica* with 1.60%, *Ranunculus acris* with 1.64%).

Regarding the Phosphorus content, while the legume and gramineae species presented a high value, respectively 0.55 – 0.67%, the other botanic species presented values of 0.30 – 0.50%.

Of the species belonging to other botanic families, rich in Potassium, we remarked the following: *Achillea millefolium* with 2.84%, *Taraxacum officinale* with 2.73%, *Urtica dioica* with 2.36%, *Cirsium vulgare* with 1.81%. These species present a Potassium content that is very similar or bigger than the one of the legume and gramineae species.

Each species' contribution to the achievement of forage quality, on pastures, may be made evident through the determination of relative specific coefficients (Csr), for each element or quality index (Table 2).

Table 1. Chemical content of various species from the pasture vegetation from Păltiniş region (230 m)

Structure of species	Proportion %	CP %	CC %	P %	Ca %	Ca / P %	K %
Association of species	-	13.78	21.29	0.35	0.46	1.31	1.69
Cichorium intybus	2	18.38	19.43	0.49	0.63	1.29	1.84
Achillea millefolium	7	24.22	18.09	0.36	1.28	3.56	2.84
Poa annua	40	13.73	24.83	0.32	0.37	1.16	1.39
Trifolium repens	2	23.55	18.21	0.67	1.89	2.82	2.47
Verbena officinalis	1	14.52	16.54	0.44	0.51	1.16	1.69
Trifolium pratense	1	22.65	18.73	0.60	1.73	2.88	2.38
Taraxacum officinale	5	24.06	18.73	0.42	0.92	2.19	2.73
Plantago major	5	17.04	15.36	0.34	0.73	2.15	1.95
Urtica dioica	5	32.46	14.51	0.47	1.60	3.40	2.36
Convolvulus arvesis	2	13.87	16.33	0.42	0.51	1.21	1.60
Euphorbia cyparissias	3	10.36	16.58	0.42	0.48	1.14	1.63
Pulicaria dysenteryca	2	12.03	18.27	0.36	0.45	1.25	1.78
Lotus corniculatus	2	21.89	17.22	0.55	1.43	2.60	2.18
Juncus effuses	1	9.46	24.32	0.31	0.37	1.19	1.43
Arctium lappa	1	11.85	17.56	0.37	0.79	2.14	1.61
Ambrosia artemisiifolia	1	16.18	22.69	0.35	0.73	2.09	1.92
Linaria vulgaris	2	13.57	17.21	0.47	0.53	1.13	1.70
Potentilla reptans	3	13.27	17.32	0.43	0.51	1.19	1.80
Mentha aquatic	3	14.82	16.34	0.53	0.64	1.21	1.95
Lolium perenne	10	16.73	25.89	0.57	0.73	1.28	1.96
Cirsium vulgare	2	14.62	17.57	0.37	0.46	1.24	1.81

Table 2. Relative specific coefficients for the plant species present in the pasture floristic structure from Păltiniş region (230 m)

Structure of species	CP	CC	P	Ca	Ca / P	K
Association of species	1.00	1.00	1.00	1.00	1.00	1.00
Cichorium intybus	1.33	0.91	0.71	1.37	0.98	1.09
Achillea millefolium	1.76	0.85	1.03	2.78	2.72	1.68
Poa annua	1.00	1.17	0.91	0.80	0.89	0.82
Trifolium repens	1.71	0.86	1.91	4.11	2.15	1.46
Verbena officinalis	1.05	0.78	1.26	1.11	0.89	1.00
Trifolium pratense	1.64	0.88	1.71	3.76	2.20	1.41
Taraxacum officinale	1.75	0.88	1.2	2.00	1.67	1.62
Plantago major	1.24	0.72	0.97	1.59	1.64	1.15
Urtica dioica	2.36	0.68	1.34	3.48	2.60	1.40
Convolvulus arvesis	1.01	0.77	1.20	1.11	0.92	0.95
Euphorbia cyparissias	0.75	0.78	1.20	1.04	0.87	0.96
Pulicaria dysenteryca	0.87	0.86	1.03	0.98	0.95	1.05
Lotus corniculatus	1.59	0.81	1.57	5.11	1.98	1.29
Juncus effuses	0.69	1.14	0.89	0.80	0.91	0.85
Arctium lappa	0.86	0.82	1.06	1.72	1.63	0.95
Ambrosia artemisiifolia	1.17	1.07	1.00	1.59	1.60	1.14
Linaria vulgaris	0.98	0.81	1.34	1.15	0.86	1.01
Potentilla reptans	0.96	0.81	1.23	1.11	0.91	1.07
Mentha aquatic	1.08	0.77	1.51	1.39	0.92	1.15
Lolium perenne	1.21	1.22	1.63	1.59	0.98	1.16
Cirsium vulgare	1.06	0.83	1.06	1.00	0.95	1.07

When Csr>1, the species contributes to the increase of forage quality in the respective elements; when Csr<1, the species generates the decrease of forage quality in this element; when Csr = 1, the species is indifferent. From this point of view, in the pastures studied, the biggest contribution to the increase of forage's CP content was observed in the following species: *Urtica dioica* (Csr = 2.36), *Achilea millefolium* (Csr = 1.76), *Taraxacum officinale* (Csr = 1.75), *Trifolium repens* (Csr = 1.71), *Lotus corniculatus* (Csr = 1.59), *Trifolium pratense* (Csr = 1.64), *Plantago major* (Csr = 1.24), *Cichorium intybus* (Csr = 1.33). At the same time, some species like *Juncus effusus* (Csr = 0.69) and *Euphorbia cyparisias* (Csr = 0.75) exert a much reduced contribution to the increase of forage's protein content. The contribution of "miscellaneous" species to forage quality is resulted from the analysis of the specific coefficients for the other nutritional elements, too.

4. Conclusions

The assessment of permanent pasture quality, just in relationship with the botanic participation of the "miscellaneous" species in the floristic structure, is not sufficient, because these species may play an important role in quality achievement and in the maintenance of the vegetal cover biodiversity. By determining the relative specific coefficients, we may estimate the contribution of the "miscellaneous" species to the expression of the general nutritional value of pasture forage.

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