

GRASSLANDS PRODUCTIVITY IN THE HYDROGRAPHIC BASIN OF THE ORĂȘTIE RIVER

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Abstract. *The permanent grasslands from the analysed area are located in the central part of the Orăștiei Corridor and the west of the Șureanu Mountains, from 225 -1,630 m altitude. The coverage with grassy vegetation is 91% and the average number of vascular plants on the vegetal associations is 60. The participation in the grassy carpet of fodder species reaches almost 60% and the harmful ones over 30%. The average pastoral value (PV) is 45 with differences from 60 - 80 for the most valuable associations to 5 - 7 for the degraded ones. The highest green mass production (GMP) of the grasslands was estimated at over 23 t/ha at As. Arrhenatherum elatioris harvested as hay and As. Trifolium repenti - Lolietum with 19 t/ha that has a grazing capacity of 1.6 UVM / ha in a season of 185 days. The worst results are obtained in the economically degraded associations Viola declinatae - Nardetum, Junco - Molinietum, Botriochloetum ischaemi and Clinopodio - Pteridietum aquilini, with 5 -7 PV and 0.4 - 0.8 t/ha GMP.*

Keywords: permanent grasslands, pastoral value, green mass production, grazing capacity

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1. Introduction

According to studies on grassland vegetation with the establishment of phytocenoses and their classification, equally important for their management is the determination of productivity, respectively green mass production and forage quality [1].

With the elaboration of a new method for evaluating the productivity of grasslands based on floristic survey, determining the pastoral value, production and optimal grazing capacity was facilitated [6].

Knowing these economic indicators helps us to draw up on a scientific basis the projects of arrangement and subsequent management of grasslands [5, 15].

This paper is a continuation of the productivity evaluation of grasslands in our country [7, 8, 9, 10, 11, 14].

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2. Materials and Methods

The doctoral thesis “*Flora and vegetation from the Orăștie River Basin*” was analysed, belonging to biologist Ioan-Valeriu VINȚAN, guided by Prof. Paul BURESCU from the University of Oradea.

The following cenotaxonomic units were found and analysed:

- Cls. *NARDO - CALLUNETEA* Preising 1949
 Ord. *NARDETALIA* Oberd 1949
 Al. *Potentillo - Nardion* Simon 1959
1. As. *Nardo - Festucetum rubrae fallax* Pușcaru et al. 1959
 - facies cu *Deschampsia flexuosa*
 2. As. *Violo declinatae - Nardetum* Simon 1966
 Cls. *MOLINIO - ARRENATHERETEA* Tx. 1937
 Ord. *MOLINIETALIA CAERULEAE* Koch 1926
 Al. *Molinion caeruleae* Koch 1926
 3. As. *Junco - Molinietum* Preising 1951
 Al. *Agrostion stoloniferae* Soó (1933) 1971
 4. As. *Agrostidetum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956
 5. As. *Ranunculo repenti - Alopecuretum pratensis* Ellmauer et Mucina in
 Mucina et al. 1993
 6. As. *Poëtum sylvicolae* Buia et al. 1959
 Ord. *ARRHENATHERETALIA* R. Tüxen. 1931
 7. As. *Arrhenatheretum elatioris* Br-Bl. ex Scherrer 1925
 Al. *Cynosurion* R. Tüxen. 1947
 8. As. *Festuco rubrae - Agrostietum capillaris* Horv. 1951
 - facies cu *Succisa pratensis*
 9. As. *Trifolio repenti - Lolietum* Krippelová 1967, Resmeriță et Pop 1967
 10. As. *Anthoxantho - Agrostietum capillaris* Sillinger 1933
 - facies cu *Euphorbia cyparissias*
 - facies cu *Dichanthium ischaemum*
 Cls. *FESTUCO - BROMETEA* Br - Bl. et Tx. in Br-Bl 1949
 Ord. *FESTUCETALIA VALESIACAE* Br - Bl. et Tx. in Br-Bl 1949
 Al. *Festucion valesiaca* Klika 1931
 11. As. *Agrostio - Festucetum valesiaca* Borislavljevič et al. 1955
 - facies cu *Thymus pulegioides*
 - facies cu *Scleranthus perennis*
 12. As. *Festucetum rupicola* Burduja et al. 1956
 - facies cu *Teucrium chamaedrys*
 13. As. *Botriochloetum (Andropogonetum) ischaemi* (Kristiansen 1937) Pop 1977

Cls. *TRIFOLIO - GERANIETEA SANGUINEI* Th. Müller 1961

Ord. *ORIGANETALIA VULGARIS* Th. Müller 1961

Al. *Trifolion medii* Th. Müller 1961

14. As. *Clinopodio - Pteridietum aquilini* Dihoru 1975

Different indices of forage value were used to determine the pastoral value, marked with 1 to 3 for species harmful to the grassy carpet and animal products and with 4 to 9 for species with forage value [2, 6, 12, 13].

The production evaluation was made on the basis of green mass indices from 1 to 9, to which useful phytomass coefficients were applied [4, 6].

Finally, for the grasslands used for grazing, the duration of the season and the optimal loading with animals were determined [3].

3. Results and Discussions

The 14 most important grassland associations belong to 7 phytosociological alliances (Table 1).

The grasslands are spread over an altitude interval of 1,400 m (225 - 1,630 m alt.), in all slope expositions, most sunny, on flat ground or with an inclination of up to 35 degrees.

Under these conditions, the average vegetation cover of the grasslands is 91% where there are an average of 59 species of vascular plants on a floristic survey.

The highest phytodiversity is found in As. *Festuco rubrae - Agrostetum capillaris* with 136 species and the lowest in As. *Nardo-Festucetum nigrescens* with only 33 species, due to grassland degradation.

Table 1. General data on the spread and phytodiversity of grassland associations in the Orăștie Basin

No.	Fitocenosis (association)	Alt. m	Exposition	Inclination. grade	Veg. cover. %	Species	
						No.	%
Potentillo - Nardion							
1	<i>Nardo-Festucetum nigrescens</i>	1,280-1,630	N,NE,SW, SE, E,	4-18	94	33	56
2	<i>Violo declinatae - Nardetum</i>	1,280-1,620	N,NE,S,SW	2-8	99	38	64
Molinion coeruleae							
3	<i>Junco - Molinietum</i>	310-1,200	Plane	0	87	56	95
Agrostion stoloniferae							
4	<i>Agrostetum stoloniferae</i>	310-320	Plane	0	89	40	68

No.	Fitocenosis (association)	Alt. m	Exposition	Inclination. grade	Veg. cover. %	Species	
						No.	%
5	<i>Ranunculo repenti - Alopecuretum pratensis</i>	225-355	Plane	0	90	47	80
6	<i>Poëtum sylvicole</i>	330	Plane	0	80	36	61
Arrhenatherion							
7	<i>Arrhenatheretum elatioris</i>	225-355	Plane	0	98	47	80
Cynosurion							
8	<i>Festuco rubrae - Agrostetum capillaris</i>	340-840	S,SE,SW, E,W,N	2-24	97	136	231
9	<i>Trifolio repenti - Lolietum</i>	290-380	Plane	0	93	58	98
10	<i>Anthoxantho - Agrostietum capillaris</i>	245-380	Plane,S,W, SE,SW	0-10	97	62	105
Festucion valesiaca							
11	<i>Agrostio - Festucetum valesiaca</i>	310-480	SW,W	14-35	91	62	105
12	<i>Festucetum rupicolae</i>	235-510	SW,S,SE,W	4-28	83	72	122
13	<i>Botriochloetum ischaemi</i>	370-460	SW,W,SE	6-14	88	70	119
Trifolion medii							
14	<i>Clinopodio - Pteridietum aquilinii</i>	410-980	S,W,SE,NW	6-18	92	73	124
	Average	225-1,630	Toate	0-35	91	59	100

The average participation of the forage species in the 14 grassland associations was 59% and of the harmful ones 32% (Table 2).

Obviously, the degree of participation of forage species directly influences the pastoral value and the useful production of green mass.

Table 2. Pastoral value, grass production and grazing capacity of grassland associations in the Orăștie Basin

No.	Association	Species participation		Pastoral value (ind.)	Green mass production		Grazing season (days)	Grazing capacity (LU/ha)
		Forage	Harmful		(t/ha)	(%)		
1	<i>Nardo-Festucetum nigrescens</i>	56	38	38.6	5.39	61	105	0.79
2	<i>Violo declinatae - Nardetum</i>	7	92	4.6	0.47	5	105	0.07
3	<i>Junco - Molinietum</i>	8	79	6.0	0.38	4	155	0.04
4	<i>Agrostetum stoloniferae</i>	80	9	61.5	13.02	147	190	1.05
5	<i>Ranunculo repenti - Alopecuretum pratensis</i>	85	5	73.6	16.70	188	Hayfield	

No.	Association	Species participation		Pastoral value (ind.)	Green mass production		Grazing season (days)	Grazing capacity (LU/ha)
		Forrage	Harmful		(t/ha)	(%)		
6	<i>Poëtum sylvicole</i>	73	7	63.0	11.10	125	Hayfield	
7	<i>Arrhenatheretum elatioris</i>	95	3	82.8	23.29	262	Hayfield	
8	<i>Festuco rubrae - Agrostetum capillaris</i>	83	14	62.2	10.54	119	170	0.95
9	<i>Trifolio repenti - Lolietum</i>	88	5	82.6	19.15	216	185	1.59
10	<i>Anthoxantho - Agrostietum capillaris</i>	86	11	65.0	10.70	120	190	0.87
11	<i>Agrostio - Festucetum valesiacae</i>	69	22	38.0	4.44	50	180	0.38
12	<i>Festucetum rupicolae</i>	70	13	38.8	7.75	87	185	0.64
13	<i>Botriochloetum ischaemi</i>	13	75	7.4	0.83	93	180	0.07
14	<i>Clinopodio - Pteridietum aquilini</i>	8	84	5.2	0.58	7	160	0.06
	AVERAGE	59	32	45.0	8.88	100	165	0.59

In our case, the hayfields harvested under the As. *Arrhenatherum elatioris* with 95% participation of forage species in the grass carpet, records 82.8 pastoral value (PV) and 23.29 t/ha green mass production (GMP).

For the grasslands grazed with animals belonging to As. *Trifolio repenti - Lolietum* with 88% participation of forage species, 82.6 PV and 19.15 t/ha GMP, it was estimated a load of 1.59 LU/ha in a season of 185 days.

This combination of *Lolium perenne - Trifolium repens* is common in the temporary grasslands of western Europe, with an oceanic climate [4].

The worst results were estimated in the floristically and economically degraded grassland associations, *Violo declinatae - Nardetum*, *Junco - Molinietum*, *Botriochloetum ischaemi* and *Clinopodio - Pteridietum aquilini*, with 7 - 13 participation of forage species registering between 4.6 - 7.4 PV with 0.38 - 0.83 t/ha GMP on which only 0.04 - 0.07 LU/ha can be maintained.

Through improvement and rational use, the productivity of these grasslands can be substantially increased [1, 5].

Conclusions

- (1). The permanent grasslands from the study area with an average of 60 species on a floristic survey have a fairly high phytodiversity;
- (2). The pastoral value varies from 5 - 7 for degraded grassland associations to 60 - 80 for the most valuable;

- (3). The production of green fodder varies from 0.4 - 0.8 t/ha for degraded grasslands up to 19 - 23 t/ha for the best grasslands;
- (4). The grazing capacity is very heterogeneous, starting from 0.04 LU/ha to 1.6 LU/ha, depending on the production and duration of the season;
- (5). Productivity data are important for drafting the pastoral arrangements and for proper management of these grasslands.

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