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The role of management in maintaining grassland sustainability in the Carpathian Mountains from Romania

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Key words : sustainability, permanent grassland, organic fertilization, biodiversity

Introduction The pastoral patrimony of Romania is represented by over 4,9 mil. ha, from which more than half are in the mountain zone. This paper's purpose is to underline the dynamics of the phytocenosis' biodiversity, due to the application of some technical practical measures meant to improve the production and the quality of the grasslands ecosystems with minimal effects on the environment. Nowadays, many specialists are concerned by adapting the technologies of fodder production to the new economic and ecological requirements (Belesky David P. et al., 2002; Peeters A. et al., 2005; Vintu V. et al., 2007).

Materials and methods The researches were conducted in two sites: on an *Agrostis capillaris* L. and *Festuca rubra* L. grassland from Campulung-Moldovenesc area (705 m altitude) and on an *Agrostis capillaris* L., *Anthoxantum odoratum* L. and *Nardus stricta* L. grassland from Vatra-Dornei area (820 m altitude), both from the Carpathian Mountains. The experiments are single factor type, set in accordance to the randomized blocks method, in four repetitions, observing the organic fertilizers' effect, a basic element in maintaining the grasslands' sustainability, in doses of 10-30 t/ha half fermented cattle manure, on biodiversity and productive level. There were observed the following fertilization variants: V₁-unfertilized control, V₂-10 t ha⁻¹ manure annually, V₃-20 t ha⁻¹ manure once at 2 years, V₄-30 t ha⁻¹ manure once at 3 years, V₅-20 t ha⁻¹ manure 1st year+10 t ha⁻¹ manure 2nd year+0 t ha⁻¹ manure 3rd year, V₆-20 t ha⁻¹ manure 1st year+0 t ha⁻¹ manure 2nd year+10 t ha⁻¹ manure 3rd year, V₇-20 t ha⁻¹ manure 1st year+10 t ha⁻¹ manure 2nd year+10 t ha⁻¹ manure 3rd year, V₈-10 t ha⁻¹ manure 1st year+20 t ha⁻¹ manure 2nd year+10 t ha⁻¹ manure 3rd year. The manure was applied in early spring, harvesting was made in hay stock mode, at dominant graminee species' ear-flower formation and the measurements regarding the biodiversity and the species' groups ratio were made in the first vegetation cycle.

Results The management of manure administration and rational use, related with soil and climate conditions positively influenced the biodiversity and the studied grasslands' productivity. Thus, in organic fertilization conditions, the number of species varied between 33 and 42, and the production between 4.28 and 4.69 t ha⁻¹ dry matter (d.m.) on the *Agrostis capillaris* L. + *Festuca rubra* L. grassland, while on the *Agrostis capillaris* L. + *Anthoxantum odoratum* L. grassland, the number of species was smaller, between 27 and 37, but productions were bigger, varying between 4.92-5.40 t ha⁻¹ (Table 1).

Table 1 The influence of grassland management on biodiversity and productivity.

Fertilization variants	<i>Agrostis capillaris</i> L. + <i>Festuca rubra</i> L. grassland					<i>Agrostis capillaris</i> L. + <i>Anthoxantum odoratum</i> L. grassland				
	Species no.	Species' groups ratio (%)			Production ha ⁻¹ d.m.	Species no.	Species' groups ratio (%)			Production tha ⁻¹ d.m.
	G	L	OS			G	L	OS		
V ¹	32	45	25	30	3.64	26	79	10	11	3.90
V ²	40	38	33	29	4.28*	27	66	19	15	4.92*
V ³	34	43	30	27	4.40*	29	69	21	10	4.95*
V ⁴	33	39	32	29	4.53*	37	68	15	17	5.03*
V ⁵	35	38	35	27	4.69*	34	65	20	15	5.36*
V ⁶	36	45	28	27	4.51*	35	70	18	12	4.71
V ⁷	35	37	32	31	4.45*	27	77	10	13	5.40*
V ⁸	42	39	31	30	4.52*	36	71	15	14	5.27*

G=grasses L=legumes OS=other species * P<0.05 = 0.51 t ha⁻¹ * P<0.05 = 0.94 t ha⁻¹

Conclusions The organic fertilization and the rational use of permanent grassland from the Romanian Carpathians assure maintaining the biodiversity and sustain the productive level, with an adequate quality of the canopy.

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