THE ORGANIC FERTILIZATION AND MULCHING FROM BEAR MEADOWS

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Abstract

The organic fertilization could be a realistic management method of the grasslands while a strong decrease of animal number takes place in Romania. The combined and long term effect of organic fertilizers upon the dry matter is rather known, but the influence upon the plant diversity is less studied. This papers' objective is to present the effect of low manure quantities combined with mulching (low-input) upon the floristic composition and dry matter yield. The study was performed in the Poienile Ursului (Apuseni Mts.) with 7 variants in 5 replications. The input effect is very low noticed at the DM yield level, and the differences do not show statistic insurance. A similar situation is seen at the floristic composition, where the same grassland type is noticed in case of all experimental variants.

Key words: organic fertilization, diversity, technological inputs, mulching

The organic fertilization produced important changes at herbaceous canopy level (Păcurar *et al*., 2009). Most traditional management techniques used organic fertilization via manure combined with the mixed uses - mowing and grazing (Samuil *et al.* 2009). Manure fertilization contributes to grasslands' plant diversity, while spring overgrazing or frequent mowing are disadvantageous (Nettier et al. 2010). Many authors have studied the effect of mulching and the decomposition of aboveground or underground litter in varying conditions (Gaiser and Pavlu, 2009). However, the rapid decomposition of the mulch is important, because a long cover and shading of the sward will cause undesirable changes in grassland composition.

MATERIAL AND METHOD

The study was initiated in 2009, in the Poienile Ursului, Gârda de Sus commune, Romania using a randomized blocks design with five replications and seven experimental treatments (V1 – control, mown once per year, V2 – mulching once per year, V3 –mulching plus 5 t ha^{-1} manure applied every year, V4 – mulching plus 5 t ha^{-1} manure applied once at two years, V5 – mulching plus 10 t ha^{-1} manure applied every year, V6 – mulching plus 10 t ha^{-1} manure applied once at two years, V7 – abandonment). Manure was collected from cattle and horses (mixed with bedding matter) and has been spread in early spring. Floristic studies were conducted at the beginning of July using the Braun-Blanquét method. Harvest took place on the 7th of July, at 5 cm cut height above the ground. For floristic data, the mean abundance-dominance (ADm) and constancy (K) were calculated. Data regarding the share of economic groups (*Poaceae, Cyperaceae-Juncaceae, Fabaceae* and other botanical families), species number and Shannon Index (SI) have been calculated. Data processing of DM yield was made by analysis of variance.

Table 1

The influence of organic fertilizers upon the dry matter (DM) yield (2010)

	Experimental variants	Dry Matter		Difference	Significance
		t ha^{-1}	%		
2010	V1	2.28	100.0	+0.00	-
	V2	1.79	78.6	-0.49	-
	V3	2.35	103.0	+0.07	-
	V4	2.00	87.9	-0.28	-
	V5	2.37	104.1	+0.09	-
	V6	2.03	89.2	-0.25	-
	V7	1.98	86.8	-0.30	
LSD 5% = 0.51		*LSD 1% = 0.70*		*LSD 0,1% = 0.94*	

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Table 2

The influence of organic fertilizers upon floristic composition (2010)

Experimental variants	V1		V2		V3		V4		V5		V6		V7	
	MAD	K	MAD	K	MAD	K	MAD	K	MAD	K	MAD	K	MAD	K
Cover (%)	91		89.8		92.8		94.4		94.4		94.4		91.8	
Species														
Poaceae	44.5		43.7		50.85		46.1		43.95		53.3		40.75	
Agrostis capillaris	25.5	V	19	V	23.5	V	22.25	V	20.25	V	25.5	V	19.5	V
Anthoxanthum odoratum	2.75	V	3.2	V	1.75	IV	2.3	V	2.2	IV	2.3	V	1.75	IV
Festuca rubra	16.25	V	21.5	V	25.5	V	21.5	V	21.5	V	25.5	V	19.5	V
Phleum montanum	0		0		0.1	I	0		0		0		0	
Cyperaceae şi *Juncaceae*	0.3		0.4		0.2		0.2		0.2		0.2		0.1	
Luzula campestris	0.3	III	0.4	IV	0.2	II	0.2	II	0.2	II	0.2	II	0.1	I
Fabaceae	9.75		8.3		13.7		14.05		12.45		11.8		7.7	
Lotus corniculatus	0.75	III	0.65	II	1.75	IV	1.2	III	3.35	III	1.55	II	0.85	IV
Trifolium pratense	4.45	V	2.3	V	7.85	V	7.5	V	4.1	V	5.25	V	1.85	V
Trifolium repens	4.55	V	5.35	V	4.1	V	5.35	V	5	V	5	V	5	V
Other botanical families	38.8		39.45		34.3		35.05		40.85		31.9		42.35	
Achillea distans	0.1	I	0.1	I	0.1	I	0.2	II	0.55	I	0.1	I	0.65	II
Achillea millefolium	0.1	I	0		0		0		0		0		0	
Ajuga genevensis	0.1	I	0.2	II	0.1	I	0.1	I	0.2	II	0.3	III	0.2	II
Alchemilla vulgaris	0.3	III	0.65	II	0.3	III	0		0.65	II	0.1	I	1.2	III
Antenaria dioica	0		0		0		0		0.2	II	0		0	
Anthyllis vulneraria	0.3	III	0.1	I	0.2	II	0.2	II	0.3	III	0.2	II	0.3	III
Arnica montana	5.7	III	4.5	II	0.65	II	0.2	II	2.9	III	1.65	III	2.3	V
Astrantia major	0		0.1	I	0		0		0		0.1	I	0.1	I
Campanula abietina	0.1	I	0.1	I	0.1	I	0.1	I	0.2	II	0		0.2	II
Centaurea mollis	0.4	IV	2.2	IV	1.75	IV	1.65	III	1.3	IV	1.75	IV	1.4	V
Centaurea pseudophrygia	1.1	II	0.65	II	0.75	III	1.1	II	0.1	I	0.75	III	0.65	II
Cerastium holosteoides	0.4	IV	0.4	IV	0.5	V	0.4	IV	0.5	V	0.4	IV	0.5	V
Cirsium erisithales	0.1	I	0.1	I	1.1	II	0.1	I	0.1	I	0.55	I	0.55	I
Colchicum autumnale	0.2	II	0.2	II	0.2	II	0.3	III	0.4	IV	0.1	I	0.2	II
Euphrasia roskoviana	0.3	III	0.5	V	0.5	V	0.4	IV	0.4	IV	0.3	III	0.5	V
Galium mollugo	0.3	III	1.75	IV	0.3	III	0.3	III	0.65	II	0.65	II	0.3	III
Gentianella lutescens	0.2	II	0.3	III	0		0.1	I	0.1	I	0.1	I	0.1	I
Gnafalium sylvaticum	0		0		0		0.1	I	0		0		0	
Gymnadenia conopsea	0.1	I	0.2	II	0.1	I	0.1	I	0.2	II	0.2	II	0.1	I
Hieracium aurantiacum	1.85	V	0.3	III	2.75	V	1.4	V	2.2	IV	1.85	V	4.45	V
Hypericum maculatum	4.7	IV	1.75	IV	2.2	IV	1.85	V	4.35	IV	1.75	IV	4	V
Knautia dipsacifolia	0.75	III	0.5	V	0.5	V	0.4	IV	0.85	IV	1.3	IV	1.3	IV
Leucanthemum vulgare	0.5	V	0.5	V	0.4	IV	1.4	V	1.4	V	0.95	V	0.4	IV
Linum catharticum	0.3	III	0.4	IV	0.2	II	0.3	III	0.2	II	0		0	
Parnasia palustris	0.1	I	0.1	I	0.1	I	0.1	I	0		0.1	I	0	
Pimpinella major	2.75	V	3.55	V	2.65	IV	4.1	V	2.75	V	2.2	IV	3.2	V
Plantago lanceolata	2.3	V	1.85	V	0.85	IV	1.4	V	1.4	V	1.85	V	0.95	V
Plantago media	0.1	I	0		0		0.1	I	0		0		0	
Polygala comosa	0.95	V	0.4	IV	0.4	IV	0.4	IV	0.2	II	0.4	IV	0.3	III
Potentilla erecta	0.1	I	0		0		0		0		0		0	
Primula veris	0.3	III	0.4	IV	0.1	I	0.85	IV	0.2	II	0.1	I	0.1	I
Prunella vulgaris	0.1	I	0		0		0		0		0		0	
Ranunculus acris	1.3	IV	0.55	I	0.4	IV	0.2	II	0.65	II	0.2	II	0.85	IV
Ranunculus bulbosus	0		0		0		0		0		0		0.55	I
Rhinanthus minor	0.95	V	0.95	V	0.95	V	1.85	V	1.4	V	0.95	V	0.85	IV
Rumex acetosa	0.4	IV	0.4	IV	0.3	III	0.5	V	0.5	V	0.5	V	0.4	IV
Scabiosa columbaria	0		0.3	III	0.1	I	0.2	II	0.1	I	0.1	I	0.2	II
Scorzonera rosea	0		0.1	I	0		0		0		0		0	
Stellaria graminea	0.5	V	0.3	III	0.5	V	0.95	V	0.5	V	0.95	V	0.5	V
Thymus pulegioides	3.65	V	7.5	V	6.6	V	3.9	IV	5.8	V	4.9	V	7.05	V
Trollius europaeus	4.55	V	4.55	V	5	V	7.05	V	6.15	V	4	V	5.7	V
Vaccinium myrtillus	0.1	I	0		0		0		0		0		0	
Veratrum album	0.5	V	0.4	IV	0.5	V	0.4	IV	0.3	III	0.4	IV	0.4	IV
Veronica chamaedrys	1.75	IV	2.1	III	2.65	IV	1.85	V	2.65	IV	1.2	III	1.4	V
Viola tricolor	0.5	V	0.5	V	0.5	V	0.5	V	0.5	V	0.95	V	0.5	V
No of species	30.2		29.4		28.4		29		28.2		26.8		29.6	
Shannon Index	2.62		2.62		2.63		2.64		2.60		2.61		2.60	

RESULTS AND DISCUSSIONS

In case of organic fertilization, the controlţs plant community is represented by *Agrostis capilaris-Festuca rubra* type, and no important changes occur at the sward level after treatments' application (*tab. 2*). Through inputs application, a slight change in the ratio among the dominant species is being seen, and *Festuca rubra* having increased its share under their influence. *Poaceaes* participation is 44.5% in witness case, and it slightly changes, reaching up to 53.5% in V6. Among *Poaceae*, the most representative species is *Agrostis capillaris* (25.5%), which slightly reduces its share in case of the treatments down to 19% in V2 and 19.5% in V7. The co-dominant species *Festuca rubra* (16.3%) increases its share through treatments application up to 25.5% in V3 and V6. *Cyperaceaes* and *Juncaceaes* are represented with 0.3% in witness and approximately the same in case of treatments application. *Fabaceaes* are present with 9.75% in control's case and slightly reduce their participation in V2 (8.3%) and V7 (7.7%) and increase it in V3 (13.7%), V4 (14.1%), V5 (12.5%) and V6 (11.8%). The representative species of this family are *Trifolium pratense* and *Trifolium repens*. The plants of OBF own a share of 38.8% in control, which under the influence of fertilization and mulching experience a decrease in V3 (34.3%), V4 (35.1%) and V6 (31.9%) and an increase in V2 (39.5%), V5 (40.85%) and V7 (42.35%). The species in this group are numerous, the ones with the most significant share being the following: *Arnica montana* (5.7%), *Hieracium aurantiacum* (1.85%), *Hypericum maculatum* (4.7%), *Pimpinella major* (2.75%), *Plantago lanceolata* (2.3%), *Thymus pulegioides* (3.75%), *Trollius europaeus* (4.55%), *Veronica chamaedrys* (1.75%). As consequence of input application, some species reduce their participation, like: *Arnica montana, Hypericum maculatum, Achillea millefolium* etc., and others increase their share: *Hieracium aurantiacum, Pimpinella major, Thymus pulegioides, Trollius europaeus* etc. the species number slightly decreases in case of the treated experimental variants down to 26.8 species in case of V6.

CONCLUSIONS

After organic fertilizers' administration and mulching no significant growths of the dry matter yield are being noticed compared to witness.

In case of organic fertilization and mulching, it is noticed that the control's type (*Agrostis capillaris- Festuca rubra*) does not change under factors action.

The ratio among the economic groups of plants changes rather low, almost unnoticeable.

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