

MANAGEMENT BASED ON ORGANIC INPUTS OF A *NARDUS STRICTA* L. AND *FESTUCA RUBRA* L. MEADOW FROM THE DORNA DEPRESSION

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Abstract

The meadows of *Nardus stricta* L. and *Festuca rubra* L. from Dorna Depression are of low productivity and quality and are mostly used for cattle grazing. Improving the trophic regime, through organic fertilization, causes a change in the floristic composition and the ratio of the species favouring the valuable ones. The research was carried out under the pedo-climatic conditions of Șaru-Dornei locality, from 2008 to 2010. The experience was conducted on an area located at an altitude of 940 m, with a slope of 10°. We followed the effect of fertilization of 20-50 t/ha manure applied annually or every two years on production, biodiversity and structure of vegetation in a meadow of *Festuca rubra* L. and *Nardus stricta* L. The manure application resulted in increases of production between 84-114%, ensured from the statistical viewpoint. Organic fertilization led to the reduction of the share of *Nardus stricta* L. species from 70-80% to 8-35% in the fertilized variants with 20 and 30 t/ha manure applied annually, in favour of the valuable species: *Festuca rubra*, *Trisetum flavescens*, *Trifolium pratense* and *Trifolium repens*.

Key words: *Nardus stricta* L., productivity, biodiversity

In Romania the grasslands of *Nardus stricta* L. occupy an area of approximately 200,000 hectares in mountainous areas. These meadows have a low productivity and quality, used over time by grazing. The improvement of the grazing regime and soil reaction determine an increase of the production and improvement of the floristic composition by increasing the share of the valuable species: *Festuca rubra*, *Trisetum flavescens*, *Trifolium pratense*, *Trifolium repens* (N. Sima et al., 2007, Djukic D. et al., 2008, Samuel C., et al., 2008; Razec I. et al., 2009, Ionescu I. et al., 2010).

MATERIAL AND METHOD

The research was done from 2008 to 2010 in the Șaru-Dornei locality from Dorna Basin, an area with an average annual temperature of +5.1°C and an amount of rainfall of 942.3 mm.

Experience was placed on a lawn of *Nardus stricta* L. and *Festuca rubra* L., situated at an altitude of 940 m and 10 ° slope. Were studied 5 different variants of organic fertilization: a₁- non-fertilized blank test; a₂-20 t/ha manure applied annually; a₃-30 t/ha manure applied annually; a₄-30 t/ha every two years and a₅-50+0+40+0 t/ha manure, in 3 repetitions, having in view the effect of applying the doses of 20-50 t/ha well-fermented manure, at different intervals of time, on production, biodiversity and structure of vegetal layer.

RESULTS AND DISCUSSIONS

Analyzing the influence of organic fertilization on dry matter production (*table 1*) we noticed that all variants of fertilization there were increases of production in comparison with the control sample ranging from 84 to 114%, statistically ensured.

The average data of the 3 years of experiments show that the differences between the four variants of fertilization are not significant, ranging from 7 to 16%. The highest production of 3.61 t/ha d.m. was obtained from the fertilized variant with 50+0+40+0 t/ha manure.

Application of manure resulted in significant changes in the structure of canopy, particularly at doses of 20-30 t/ha applied annually, where the number of pulses increased from 2% to 18-21% in 2008, from 4% to 22-25% in 2009 and from 2% to 15-17% in 2010. The share of different species increased from 2008 to 2010, the same dose of manure, from 10-16% to 23-43%, and grasses decreased from 82-86% to 42-55% (*Figure 1*) by reducing the share of the dominant species, *Nardus stricta* L.

The increase of the weight of the leguminous species (*Trifolium pratense*, *Trifolium repens*) of the canopy determines an improvement of the nutritional value and the degree of consumption of obtained fodder.

Table 1

Production of dry matter in the period 2008-2010					
Variant of experiment	Production d.m. t/ha				% / control sample
	2008	2009	2010	Average	
Non-fertilized control sample	2,83 ^{Mt}	1,13 ^{Mt}	1,10 ^{Mt}	1,69 ^{Mt}	100
20 t/ha annual manure	4,62	1,67	3,62**	3,30**	196
30 t/ha annual manure	4,71*	2,40**	3,16*	3,42**	203
30 t/ha two-year manure	4,92**	1,48	2,90*	3,10*	184
50+0+40+0 t/ha manure	4,81	1,77	4,25**	3,61**	214
DL	5%	2,24	0,58	1,50	1,00
	1%	3,25	1,10	2,18	1,50
	0,1%	4,88	1,65	3,27	2,22

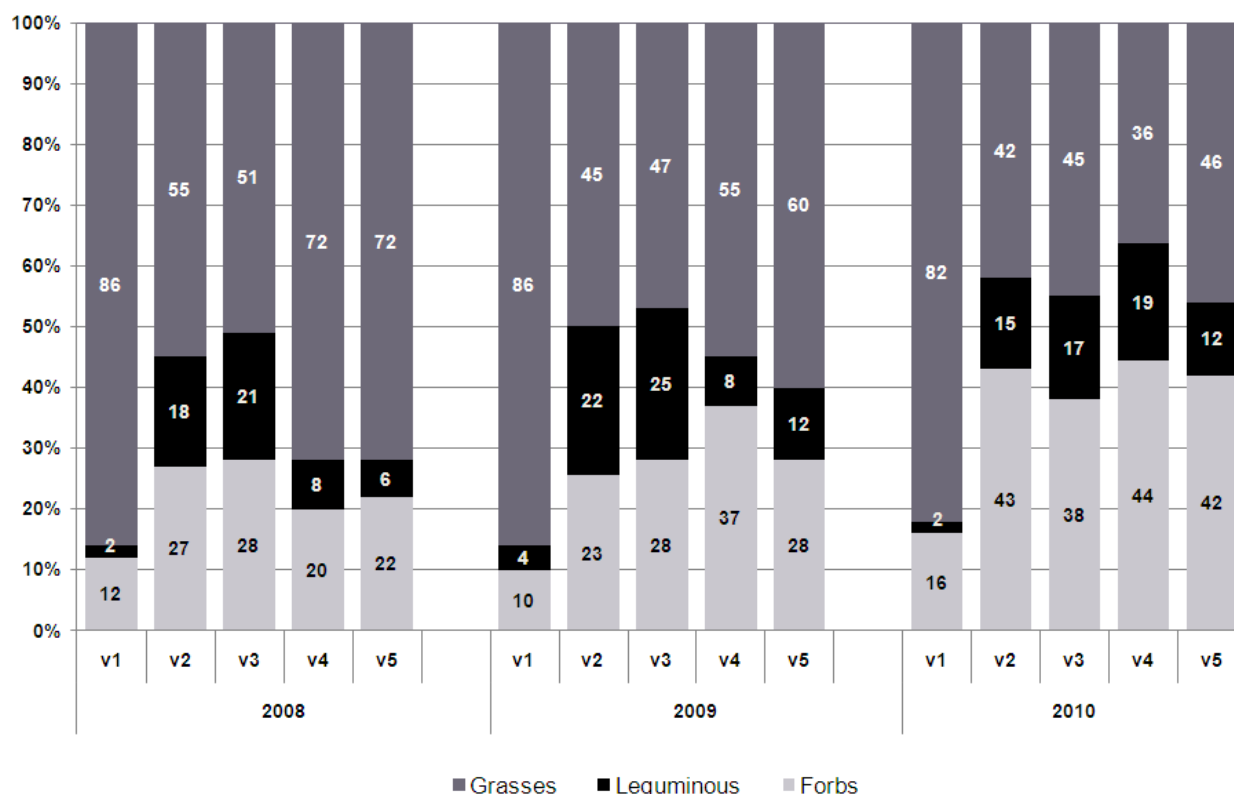


Figure 1 Influence of organic fertilization on the canopy structure

The data obtained from Șarul-Dornei, are the same with the results obtained in similar conditions by I. Rotar et al., 2003; Vintu, V. et al. (2009).

The table 2 shows the evolution of the floristic composition and structure of the canopy of the meadow of *Nardus stricta* L. and *Festuca rubra* L., under the influence of organic fertilizer application.

The recorded data shows that the variants fertilized with 20-30 t/ha manure applied annually, the coverage of dominant species, *Nardus stricta* L., decreases from 76-80% in the control version, only 8 - 35% in favour of increasing the coverage of valuable grass species: *Festuca rubra* from 4%

to 6-12% and *Trisetum flavescens* from 2% to 6-14%. The leguminous plants have the best response to the application of manure. Thus, *Lotus corniculatus* species, present initially only in canopy, reached a coverage of 13% in 2010 after the fertilization with 30 t/ha manure applied annually; *Trifolium repens* has reached from a coverage of 2% to 6-10% to the annually fertilized variants, the biggest increase was registered at the species *Trifolium pratense*, which, at the annual application of 20-30 t/ha manure, reached a coverage of 4-12% (fig. 2).

Table 2

Influence of organic fertilization on biodiversity

Species	Specific coverage (%)														
	V1			V2			V3			V4			V5		
	'08	'09	'10	'08	'09	'10	'08	'09	'10	'08	'09	'10	'08	'09	'10
<i>Brachypodium pinnatum</i>	+	-	-	+	+	+	5	-	+	+	+	+	+	1	-
<i>Festuca rubra</i>	4	8	5	8	6	6	7	2	7	10	6	7	12	8	6
<i>Holcus lanatus</i>	-	-	-	-	-	3	-	-	+	-	-	-	-	1	+
<i>Nardus stricta</i>	80	70	71	35	18	12	25	8	14	54	35	15	44	15	17
<i>Trisetum flavescens</i>	2	-	+	12	10	10	14	6	9	8	4	2	11	10	8
<i>Anthoxanthum odoratum</i>	-	4	2	-	+	3	-	2	4	+	2	3	+	5	3
<i>Agrostis tenuis</i>	-	4	3	+	6	4	+	12	6	-	6	3	3	15	6
<i>Briza media</i>	-	+	-	-	2	+	+	7	+	-	+	2	-	+	2
<i>Arrhenatherum elatius</i>	-	-	-	-	3	1	-	8	3	+	2	+	+	2	2
<i>Cynosurus cristatus</i>	-	-	-	+	+	3	+	2	+	-	+	+	+	3	+
<i>Dactylis glomerata</i>	-	-	-	-	-	+	-	+	+	+	-	+	-	+	+
Grasses	86	86	82	55	45	42	51	47	45	72	55	36	72	60	46
<i>Lotus corniculatus</i>	-	-	1	2	+	1	4	8	13	+	1	5	+	6	4
<i>Trifolium pratense</i>	+	2	+	8	12	4	7	9	5	6	4	8	6	4	6
<i>Trifolium repens</i>	2	2	1	6	10	10	10	8	8	2	3	6	+	2	2
Leguminous	2	4	2	18	22	15	21	25	17	8	8	19	6	12	12
<i>Achillea millefolium</i>	2	2	3	5	+	8	4	4	11	4	5	16	2	5	8
<i>Alchemilla vulgaris</i>	2	2	2	5	1	8	7	10	8	6	10	6	6	8	5
<i>Campanula persicifolia</i>	2	1	1	+	+	6	-	+	+	+	+	1	+	+	9
<i>Carlina acaulis</i>	-	-	1	-	+	+	8	6	-	+	+	+	2	6	+
<i>Centaurea phrygia</i>	2	3	2	5	5	4	5	4	5	10	15	2	8	5	2
<i>Galium verum</i>	-	+	-	+	+	-	+	+	+	+	+	-	-	+	+
<i>Plantago lanceolata</i>	2	1	1	10	8	6	4	+	4	+	5	6	4	4	2
<i>Potentilla erecta</i>	+	-	2	+	2	5	+	+	5	+	+	8	+	+	4
<i>Ranunculus acris</i>	-	+	-	+	+	-	+	+	-	-	+	-	-	+	-
<i>Taraxacum officinale</i>	2	1	2	2	3	8	+	+	6	+	2	10	+	+	5
<i>Veronica chamaedrys</i>	-	+	1	+	3	12	+	+	10	-	+	14	+	+	15
<i>Tragopogon</i>	-	-	-	+	-	+	-	+	+	-	+	-	-	+	+
<i>Sonchus</i>	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-
<i>Chrysanthemum</i>	-	-	-	+	+	-	+	+	+	+	+	+	+	+	-
<i>Rinanthus minor</i>	-	-	-	-	+	+	-	+	+	-	+	+	+	+	+
<i>Thymus serpyllus</i>	-	-	1	+	+	-	+	+	4	+	+	3	+	+	+
<i>Galium cruciata</i>	-	+	-	+	+	-	+	+	-	+	+	-	-	+	-
<i>Hypericum perforatum</i>	-	-	1	-	1	2	+	+	+	-	+	-	+	+	+
<i>Linum</i>	-	-	-	+	+	+	-	+	-	+	+	+	+	+	-
<i>Hieracium</i>	-	-	+	-	+	+	+	+	+	+	-	+	+	+	+
Moss	+	+	-	-	+	-	-	+	-	-	-	-	-	+	-
Forbs	12	10	16	27	23	43	28	28	38	20	37	44	22	28	42
Total coverage %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
No. species	13	18	19	24	32	28	24	32	29	24	31	27	25	35	27

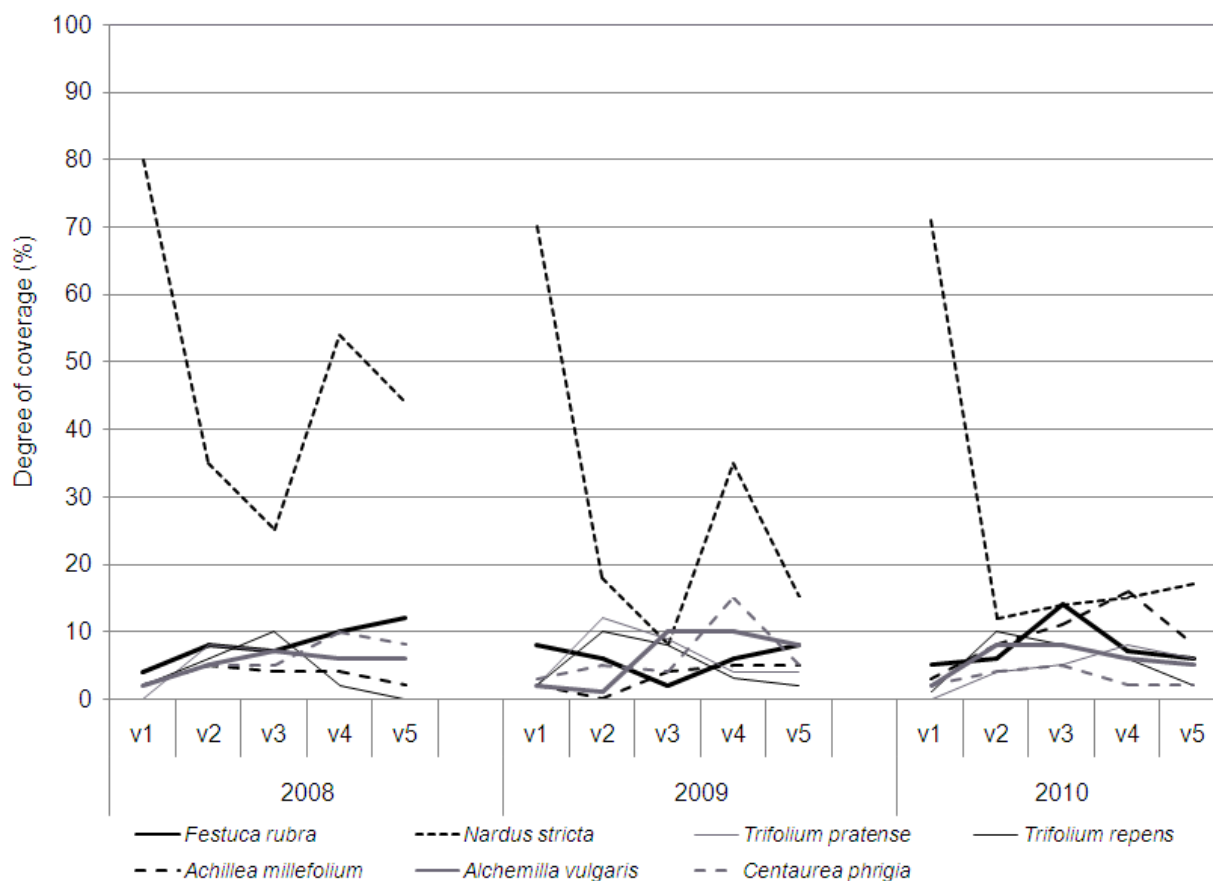


Figure 2 Influence of organic fertilization on the degree of coverage of the main grassland species from the meadow of *Nardus stricta* L. and *Festuca rubra* L.

CONCLUSIONS

The organic fertilization positively influenced the production of dry substances at all the variants of fertilization, production increases in comparison with the control samples, of 84-114% being statistically ensured.

The application of manure resulted in changing the structure and composition of canopy, particularly at doses of 20-30 t/ha applied annually, where the dominant species, *Nardus stricta* L., registered a significant decline in share favouring the species with good fodder value.

The changes produced in the Management of the meadow of *Nardus stricta* L. and *Festuca rubra* L. have increased the biodiversity of flora, from 13 - 19 species in version control to 24-35 in the fertilized variants.

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