

## THE IMPROVEMENT OF THE DEGRADED GRASSLANDS THROUGH RADICAL RECOVERY

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### Abstract

*Grasslands, through their productions, contribute to the fodder supplies with a forage rich in digestible nutritive substances, well consumed by the ruminants and horses. The grasslands' functions are complex and they balance multiple ecological, economical and social aspects. The permanent grasslands degraded by the lack of improving measures' application and by an irrational use present a destroyed vegetal carpet, with a low covering percentage and an improper floristic composition, which conduct to small and low qualitative productions. These grasslands can be improved by radical recovery (plough and seeding a mixture of valuable graminee and leguminous species). By establishing temporary grasslands as a replacement of the degraded permanent ones, we obtained in the southwestern area of Brăila County production increases of 25 – 82%. The fodder obtained from the temporary grasslands is high qualitative and can provide the necessary supplies for the fodder base.*

**Key words:** grassland, degradation, fertilization, temporary, improvement

### INTRODUCTION

The permanent grasslands from Romania, spread on 4.87 million hectares, represent one of the sources for providing succulent and rich fiber fodder, required in the ruminants' and horses' nutrition [2].

When grasslands are used through pasturing, the animals receive a succulent fodder, rich in nutritive salts and take benefit from the positive action of the climate factors that fortify their organisms [3]. The grasslands from the S-V part of Brăila County present a low productive potential (3-5 t/ha green mass), with dominant xerophytes graminee species, with low fodder value. Because of the long periods of drought, the lack of improving measures' application and an irrational use, the vegetal carpet is mostly destroyed, the floristic composition becomes improper and the permanent grasslands are degraded. The improvement of these grasslands can be realized through radical recovery works, consisting of plough, seeding a mixture of valuable, perennial graminee and leguminous grassland species, specific to the area and organizing the rational use [1].

### MATERIAL AND METHOD

During 2004-2006, we established a single factor experiment, on a degraded *Festuca valesiaca* grassland in Șuțești community, Brăila County, in order to improve it, by transforming it in a temporary grassland, through plough, seeding and fertilization. We used as fertilizers cattle manure and complex chemical fertilizers (12-22-0), in different doses:

1. Unfertilized control
2. Manure 20 t/ha applied annually
3. Manure 40 t/ha applied once at two years
4. Complex fertilizer 12-22-0 – 100 kg/ha annually
5. Complex fertilizer 12-22-0 – 200 kg/ha annually
6. Manure 20 t/ha + complex fertilizer 100 kg/ha annually
7. Manure 20 t/ha + complex fertilizer 200 kg/ha annually
8. Manure 40 t/ha + complex fertilizer 100 kg/ha once at two years
9. Manure 40 t/ha + complex fertilizer 200 kg/ha once at two years.

The cattle manure, with a chemical composition of N = 0.82%, K<sub>2</sub>O = 0.54%, P<sub>2</sub>O<sub>5</sub> = 0.98%, humidity 72.4%, was applied

in the fall and the complex fertilizers, in the spring, along with the mixture of perennial graminee and leguminous grassland species' seeds. The mixture of perennial graminee and leguminous grassland species' seeds used for seeding consists of: *Bromus inermis* 35% (17 kg/ha); *Dactylis glomerata* 15% (5 kg/ha); *Agropyron pectiniforme* 10% (4 kg/ha); *Onobrychis viciifolia* 25% (30 kg/ha) and *Medicago sativa* 15% (4 kg/ha). We expressed the production yield in dry substance and the statistic calculus implied the variance analysis.

## RESULTS AND DISCUSSIONS

In order to accomplish the objectives proposed in the experimental protocol, we chose to plough a degraded grassland, with low productions, dominated by *Festuca valesiaca*; we prepared the field with mechanical devices and in the spring of 2005 we seeded the mixture. We observed the

influence of the plant species and of fertilization on production, vegetal carpet's biodiversity and on the obtained fodder's quality.

### The influence of fertilization on production yield for the temporary grassland

The fertilization with cattle manure lead to production yields of 5.5 – 5.6 t/ha, with increases of 25 – 26 % compared to control; when complex fertilizers were applied, production yields were of 5.8 – 6.2 t/ha, with increases of 32 - 41%, and when manure and complex fertilizers were applied together, production yields were of 6.0 – 6.9 t/ha for the doses of 20 t/ha manure annually, with increases of 36 - 57% and when 40 t/ha manure once at two years were used, production yields were of 7.1 – 8.0 t/ha, with increases of 61 – 82 % (tab. 1).

Table 1  
 The influence of fertilization on production yield for the temporary grassland (mean values 2004-2006)

No. Crt.	Fertilization	Production d.s.		Differences (t/ha)	Significance
		t/ha	%		
1.	Unfertilized control	4.4	100	-	
2.	Manure 20 t/ha applied annually	5.5	125	1.1	**
3.	Manure 40 t/ha applied once at two years	5.6	127	1.2	**
4.	Complex fertilizer 12-22-0 – 100 kg/ha annually	5.8	132	1.4	***
5.	Complex fertilizer 12-22-0 – 200 kg/ha annually	6.2	141	1.8	***
6.	Manure 20 t/ha + complex fertilizer 100 kg/ha annually	6.0	136	1.6	***
7.	Manure 20 t/ha + complex fertilizer 200 kg/ha annually	6.9	157	2.5	***
8.	Manure 40 t/ha + complex fertilizer 100 kg/ha once at two years	7.1	161	2.7	***
9.	Manure 40 t/ha + complex fertilizer 200 kg/ha once at two years	8.0	182	3.6	***

DL 5% = 0.7 t/ha; DL 1% = 0.9 t/ha; DL 0.1% = 1.3 t/ha;

### The effect of fertilization on the vegetal carpet's biodiversity

By seeding the perennial graminee and leguminous mixture, the participation of the graminee species in the vegetal carpet reached 54 - 60% in 2004, the leguminous species' one of 25 – 35% and the various species' one of 5 – 18%. After three years we observed small changes in the biodiversity: the graminee ratio increased with 1 – 5% with the complex fertilizers' application and

with 2 – 3% when 20 t manure/ha + complex fertilizers were applied; the graminee ratio decreased with 3% when 20 – 40 t manure /ha were applied and with 1-2% for the fertilization with 40 t manure /ha + complex fertilizers; the participation of the leguminous species decreased with 1-2% when 20 – 40 t manure /ha + complex fertilizers 100 kg/ha were applied and increased with 1-3% for the other fertilization variants (tab. 2).

Table 2  
 The influence of fertilization on vegetal carpet's biodiversity

No Crt	Fertilization	Graminee %		Leguminous %		Various species %	
		2004	2006	2004	2006	2004	2006
1.	Unfertilized control	60	58	30	28	10	14
2.	Manure 20 t/ha applied annually	58	55	25	23	17	22
3.	Manure 40 t/ha applied once at two years	56	53	28	27	16	20
4.	Complex fertilizer 12-22-0 – 100 kg/ha annually	60	61	35	34	5	5
5.	Complex fertilizer 12-22-0 – 200 kg/ha annually	57	62	33	34	10	4
6.	Manure 20 t/ha + complex fertilizer 100 kg/ha annually	59	61	25	28	16	11
7.	Manure 20 t/ha + complex fertilizer 200 kg/ha annually	55	58	26	29	19	13
8.	Manure 40 t/ha + complex fertilizer 100 kg/ha once at two years	57	55	25	28	18	17
9.	Manure 40 t/ha + complex fertilizer 200 kg/ha once at two years	54	55	29	30	17	15

**The influence of fertilization on fodder's content in raw protein and raw cellulose**

The fodder's high content in protein was conditioned by the high participation percentage of the leguminous species in the mixture (40 %). In 2004, the fodder's content in protein was of 18.5 – 22.82 % and in cellulose of 19.2 – 21.1 %; in 2006, the

protein content decreased for the fertilization with 20 – 40 t manure/ha (17.8 – 18.82 %) and increased for the other variants (21.25 – 22.92 %); the cellulose content decreased for the fertilization with 20 t manure/ha + complex fertilizers 100 kg/ha (19.7 – 19.85%) and with 40 t manure/ha + complex fertilizers 200 kg/ha (19,85 %) (tab. 3).

Table 3  
 The influence of fertilization on fodder's content in raw protein and raw cellulose

No. Crt.	Fertilization	Raw protein		Raw cellulose	
		2004	2006	2004	2006
1.	Unfertilized control	18.5	17.80	21.10	21.35
2.	Manure 20 t/ha applied annually	19.25	18.82	19.25	20.10
3.	Manure 40 t/ha applied once at two years	20.53	19.65	20.05	20.75
4.	Complex fertilizer 12-22-0 – 100 kg/ha annually	21.25	19.92	19.70	20.15
5.	Complex fertilizer 12-22-0 – 200 kg/ha annually	22.40	22.53	19.20	20.05
6.	Manure 20 t/ha + complex fertilizer 100 kg/ha annually	20.15	21.25	20.25	19.85
7.	Manure 20 t/ha + complex fertilizer 200 kg/ha annually	20.83	21.65	20.30	19.70
8.	Manure 40 t/ha + complex fertilizer 100 kg/ha once at two years	22.62	22.92	20.10	20.25
9.	Manure 40 t/ha + complex fertilizer 200 kg/ha once at two years	22.82	22.86	20.15	19.85

**CONCLUSIONS**

1. The permanent grasslands from the southwestern part of Brăila County, degraded

by the climate factors and the irrational use can be improved through radical works and the replacement with temporary grasslands;

2. For the dry area from Romanian Field, in order to establish temporary grasslands it is required to use perennial graminee and leguminous species adapted to the local conditions (*Bromus inermis*, *Dactylis glomerata*, *Agropyron pectiniforme*, *Onobrychis viciifolia*, *Medicago sativa*);

3. The fertilization of the temporary grasslands with organic and mineral fertilizers, applied single or together, contributes to the production increase with 25 – 82 % compared to the unfertilized control;

4. The vegetal carpet's biodiversity for the temporary grasslands suffered small changes under the influence of fertilization in all three experimental years: it increased the graminee ratio with 1 – 5 % and decreased

the leguminous species' participation with 1 – 3 % for the complex fertilizers application;

5. The content in raw protein maintains high for all fertilization variants and the cellulose content, relatively low, due to the high percentage of leguminous species in the seed mixture used for seeding.

## REFERENCES

### Books

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