The Influence of Sheep Fertilizing and Oversowing on the Lawns of the Cindrel Mountain

Mariana Rusu, Doina Popa

Institute of Research –Development for Montanology, Cristian-Sibiu

Abstract
Massive Cindrel natural grasslands have an estimated yield between 1.9 to 3 t / ha. Applying environmentally friendly technologies are expected to improve the yield crops by reducing to extinction the floristic composition of some species like *Nardus stricta*, while *Festuca rubra* and *Agrostis tennuis* percentages increase and production yield rise 2 to 2.5 times. The paper aims to increase de intake rate of the pastures during grazing the areas with sheep, following by over seeding the surfaces with simple or complex mixtures of grasses and legumes. Suggested system is unpollutant and induces protection of the prato-ecosystems from the mountain regions.

Keywords: floristic composition, grazing, sheep.

1. Introduction:

The natural lawns situated in the proximity of the experimental field in Paltinis obtain productions ranged between 1.9-3 t/ha [1]. By applying the amelioration measures we had in view the improvement of the floristic composition of the lawns, by reducing up to disappearance the participation of species N. and increasing the percentage of species F. rubra and A. Tenuis, at the same time with the increase of the production up to 2-2.5 times.
This paper is meant to establish the floristic composition of lawns, of the crop of S.U. and of the chemical composition of the fodder, under the influence of sheep fertilizing and oversowing.

2. Materials and method

The experiment located in Paltinis during the period 2008-2010 was organized in two blocks at random, herbicide being used on one of them while on the other herbicide was not used. Both blocks have been sown with various species and mixtures of species. In each block there have been established seven variants (10m/variant) being repeated three times.
The experimental variants were the following:

V_1 - Festuca rubra - 20 Kg/ha
V_2 - Phleu pratense -16 Kg/ha
V_3 - Dactylis glomerata -25 Kg/ha
V_4 - Trifolium repens - 5 Kg/ha
V_5 - Lotus corniculatus -15 Kg/ha
V_6 –Simple mixture -Phleum pratense - 8Kg/ha
-Trifolium repens – 2.5 Kg/ha
V_7 – Complex mixture - Festuc rubra - 5 Kg/ha
-Phleum pratense - 5 Kg/ha
-Dactylis glomerata - 5 Kg/ha
-Trifolium repens – 2.5 Kg/ha
-Lotus corniculatus - 5 Kg/ha

The two experimental blocks were sheep fertilized uniformly for three nights ensuring a density of 1.5 sheep/sq.m [2]. The experiment was made on an acid brown soil with a clayey texture, pH-4.62 (in water) and the rapport C/N of 16.7 [3].

* Corresponding author: Rusu Mariana,
Tel:+40269579408, icdmcristian@yahoo.com

3.Results and discussion

a. The crop of dry substance

Table 1. The crop of dry substance

Variant	Production. t/ha	Prod. rel. %	Diff. t/ha	Significance
Witness	1.11	100	-	-
V_2	1.00	90.12	-0.11	000
V_3	0.86	76.95	-0.26	000
V_4	1.10	99.10	-0.01	-
V_5	1.11	99.70	0	-
V_6	1.01	91.02	-0.10	000
V_7	1.19	106.89	0.08	**

DL 5% - 0.04
DL 1% - 0.06
DL 0.1% - 0.09

In 2008 the biggest crop of S.U. is recorded at variant 7 (complex mixture) which achieved a definitely distinct difference of 0.08 t/ha as compared to the witness [4].

Table 2. Crop of S.U. (t/ha) in the year 2009 (block with herbicide)

Variant	Prod. t/ha	Prod. rel. %	Diff. t/ha	Significance
Witness	1.77	100	-	-
V_2	1.22	58.98	- 0.55	000
V_3	1.34	75.56	- 0.43	000
V_4	1.58	89.10	- 0.19	000
V_5	1.64	92.48	- 0.13	000
V_6	1.31	73.87	- 0.46	000
V_7	1.72	96.99	- 0.05	000

DL 5% - 0.02
DL 1% - 0.03
DL 0.1% - 0.04

The biggest crop of S.U. is recorded at the witness variant (Festuca rubra). Next to it there is the complex mixture (V7) with 1.72 t/ha S.U. The differences from the witness recorded to the other variants are statistically very significantly negative.

Table 3. Crop of S.U. (t/ha) in the year 2009 (block with herbicide).

Variant	Prod. t/ha	Prod. rel. %	Diff. t/ha	Significance
Witness	3.18	100	-	-
V_2	3.58	112.68	0.40	***
V_3	2.97	93.40	- 0.21	000
V_4	3.49	109.75	0.31	***
V_5	3.88	122.12	0.70	***
V_6	3.62	113.94	0.44	***
V_7	4.06	127.67	088	***

In the year 2010 the vegetal carpet after using herbicide was closed mainly by spontaneous colonization and by the spare seeds in the soil, the vegetation conditions were more favourable, therefore the crops were bigger than during the previous years. The biggest crop of S.U. was recorded on variant V7 (4.06 t/ha-127.67% as compared to the witness), this achieving a significant difference of 0.88 t/ha as compared to V1 (Festuca rubra-witness). At the other variants there were obtained productions which oscillated between 2.97 and 3.88 t/ha, the production differences recorded at these variants as compared to the witness are due not necessarily to the sown material but to the way in which the vegetal carpet was closed after the use of herbicide by spontaneous colonization and from the spare seeds.

Table 4. Crop of S.U. (t/ha) in the year 2008 (block without herbicide)

Variant	Prod. t/ha	Prod. rel. %	Diff. t/ha	Significance
Witness	2.77	100	-	-
V_2	2.85	103.01	0.08	-
V_3	2.63	94.95	-0.14	00
V_4	2.84	102.65	0.07	-
V_5	2.74	98.80	-0.03	-
V_6	2.78	100.48	0.01	-
V_7	2.82	101.81	0.05	-

DL 5% - 0.09
DL 1% - 0.12
DL 0.1% - 0.17

On the vegetal carpet without herbicide the biggest crop of S.U. was recorded on variant V2- 2.85 t/ha. At the other variants the crops obtained oscillated between 2.63-2.84 t/ha, the differences achieved being insignificant as compared to the witness.

Table 5. Crop of S.U. (t/ha) in the year 2009 (block without herbicide)

Variant	Prod. t/ha	Prod. rel. %	Diff. t/ha	Significance
Witness	2.79	100	-	-
V_2	2.94	105.25	0.15	***
V_3	2.65	94.87	- 0.14	000
V_4	2.74	98.89	- 0.05	0
V_5	2.71	97.02	-0.08	00
V_6	2.61	93.44	-0.18	000
V_7	2.94	105.25	0.15	***

DL 5% - 0.04
DL 1% - 0.06
DL 0.1% - 0.09

In the year 2009 the biggest crop of S.U. was recorded on V2 (Phleum pratense) 2.94 t/ha i.e. V7 (complex mixture) 2.94 t/ha which achieved very significant differences of 0.15 t/ha as compared to the witness.

Table 6. Crop of S.U. (t/ha) in the year 2010 (block without herbicide)

Variant	Prod. t/ha	Prod. rel. %	Diff. t/ha	Significance
Witness	2.52	100	-	-
V_2	3.03	119.76	0.50	***
V_3	2.84	112.25	0.31	***
V_4	2.13	84.19	-0.40	000
V_5	2.52	99.74	-0.01	0
V_6	2.91	115.15	0.38	***
V_7	3.13	132.85	0.60	***

DL 5% - 0.04; DL 1% - 0.06; DL 0.1% - 0.09

In 2010 in the block without herbicide the biggest crop of S.U. was recorded at V7 which achieved a very significant difference of 0.60 t/ha as compared to the witness (2.52 t/ha). Very significant differences were achieved at variants V3, V2 and V6.

The content of protein ranges between 8.72% (Trifolium repens) -15.96% (complex mixture). The great content of protein at variants V2, V6 and V7 is due to Phleum pratense species which under the conditions of the experiment at the harvest date does not form flower undergrowth[5]. The content of raw cellulose ranges between 26.10% on V1 where Ph pratense species is the largest (58%) and 36.76 % on V witness, where F rubra species gets to a covering area of 87%. The content of non nitric extracts has high values ranging between 44.54% on V6 and 51.81% on V4. The content of raw fat ranges between 2.84% on V6 and 1.83% on V7 which shows a normal content of minerals of the analyzed material.

b. Chemical composition of the dry substance (%)

Table 7.. Chemical composition of the dry substance % in the block without herbicide, 2010

Variant	Raw protein	Raw cellulose	Raw ashes	Raw fat	Non nitric extracts
Witness	9.59	36.76	5.61	2.16	45.88
V_2	13.26	26.10	8.08	2.36	50.25
V_3	9.18	32.38	6.25	2.07	50.12
V_4	8.72	30.94	6.49	2.04	51.81
V_5	13.86	27.07	5.94	3.09	50.03
V_6	12.51	34.75	6.36	2.84	44.54
V_7	15.96	29.78	7.31	1.83	45.12

Table 8. Chemical composition of the dry substance % in the block without herbicide

Variant	Raw protein	Raw cellulose	Raw ashes	Raw fat	Non nitric extracts
Witness	10.2	5.10	27.10	2.85	45.59
V_2	14.9	5.90	28.35	3.10	44.20
V_3	14.1	6.05	30.10	2.10	48.35
V_4	13.8	4.95	29.90	2.95	45.75
V_5	11.3	5.85	28.95	3.00	43.95
V_6	12.9	5.25	29.10	2.75	46.10
V_7	12.1	5.40	28.75	2.60	47.45

The raw protein ranges between 11.3 (V5) – 14.9 (V2), the lowest value being recorded at the witness variant, i.e. 10.2%. The raw cellulose ranges between 4.95(V4) and 6.05% (V3). The content in non nitric extract ranges between 43.95% (V5) and 48.35% (V3) while the fat ranged between 2.10 (V3) and 3.10 (V2).

Conclusions

-From all the experimental variants it is the complex mixture sown on variant seven which has the highest percentage of covering ever since the first year (56%). We can remark a very good establishment of F. rubra and Ph. Pratense species of 20% for the first one and 18% for the second one ever since the first year.

-In the block on which herbicide was used the biggest crop of S.U. is recorded on V7 (complex mixture) -1.19 t/ha (2008), 4.06 t/ha (2010) i.e. V1 (witness-F.rubra) 1.77 t/ha (2009). The big crop of S.U. on V7 in 2010 is due less to the sown material but more to the way in which the vegetal carpet was closed after the herbicide, by spontaneous colonization and from the spare seeds.

-In the block without herbicide the biggest crop of S.U. is recorded on V2 (2.85 t/ha)-2008, V2 (2.98 t/ha) and V7 (2.96 t/ha) in 2009 and V7 (3.13 t/ha) i.e. (3.03 t/ha) in 2010.

-The oversowing of the existent vegetal carpet does not bring about an increase of the crop of S.U. on the lawns dominated by aggressive graminaceae such as: F. rubra and A. tenuis, so only the sheep fertilization made after sowing causes slight increases of the production.

-The results regarding the chemical composition of the fodder records similar values to the ones met in the specialty literature for the mountainous lawns.

References

1. Anghel, GH., and collab.- Pastures in Cindrel Mountains.Scientific papers of ICPCC Magurele - Brasov, vol. X., pp. 279-295
2. Marusca, T., Ecological reconstuction of degraded pastures, Transylvania University Publishing House of Brasov, 2008
3. Rusu, M., Promotion of sustainable agricultural technologies in order to consolidation rural farm from mountain area, ed. Risoprint, Cluj-Napoca, 2002
4. Vantu, V., Moisuc, Al., Motca, Gh., Rotar, I.,Cutivation of pastures and fodder, Ion Ionescu de la Brad Publishing House, Iasi, 2004
5. Sima, N., Ecopratology, Accent Publishing House, Cluj-Napoca, 2006