Scientific Papers. Series E. Land Reclamation, Earth Observation & Surveying, Environmental Engineering. Vol. XI, 2022
Print ISSN 2285-6064, CD-ROM ISSN 2285-6072, Online ISSN 2393-5138, ISSN-L 2285-6064

REASONS FOR MAINTAINING AND/OR INTRODUCING TREES ON GRASSLANDS

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Abstract

Grasslands with sparse trees are a high biological and cultural value agroforestry system, which are not enough promoted in Romania. In this article, a grassland with sessile oak and pedunculate oak and one without trees were studied. Data were collected from a number of 7 sample areas distributed randomly with an area of 100 m^2. In these surfaces were taken soil samples from the layer 0 - 10 cm deep and samples of grassy species, about 200 grams. Also, in the grassland with sparse trees all the trees were inventoried and were measured the diameter of the trunk at 1.30 m, the height of the trees and the projection of their crown.
From the analysis of the data, the grassland with trees is superior to the tree-less grassland, from all points of view: productive, protective and aesthetic, which is why this agroforestry system in the temperate zone of our country plays a very important role in maintaining a balance between the quality of the pastures and the quantity and quality of the animal products obtained.

Key words*: agroforestry system, grasslands with sparse trees, grassy species, trees, protective.*

INTRODUCTION

For more than four decades, agroforestry, along with agriculture and forestry, have contributed to ensuring sustainable land management and have studied all land use systems in which agricultural and forestry species combine on the same land area in order to increase ecological, economic and social benefits (Bene et al., 1977 cited by MacDicken and Vergara, 1990; Leakey, 1996).
Grassland with trees (along with forest shelterbelts) are the most representative agroforestry systems in our country, in terms of occupied areas and the ecological, economic and social benefits they provide (Costăchescu et al., 2010; Marușca, 2017).
There is no rigorous country-wide statistics on the area occupied by grassland with tree, but following the research undertaken, they are found in large areas in the Transylvania area, but also in the Dobrogea Tableland. Grassland located in the lowland area and low hills not comprise significant forest vegetation, although in these areas the impact of climate change on grass vegetation and animals is greater. It is the area where forest deforestation in the last two centuries has been massive, inclusive in grasslands, where there is no longer tree forest vegetation but only shrubs or no forest vegetation. In relation to the total area of the country, grassland (with and without trees) occupies 14.11%, which represents approximately 3,36 million hectares (www.insse.ro). Grasslands belong to communities, are managed at the level of the Hall and are usually grazed by cattle, sheep and goats. The scattered trees on grassland, referred to in this paper as grassland with trees, mainly come from oaks forests which have been gradually cut over the last 100 to 200 years, where a small number of oaks, wild pear and other species remained. The main problem of grassland with trees is that the few old trees present on grassland will gradually disappear and, given the impossibility of natural regeneration (due to constant grazing), the continuity of these species can be much more difficult. In addition, grassland mainly existing in the lowland and hill areas does not have trees but only shrubs in isolation. Under these circumstances it is necessary to plant trees on pasture, with all the difficulties that this process raises.

The present paper presents the research carried out in two pastures, with trees and without trees, located in the locality of Herculian, the commune of Bățani, the county of Covasna.

MATERIALS AND METHODS

In order to study the influence of trees on grass vegetation and both directly and indirectly on animals, a comparative analysis of one permanent grassland with oak trees (*Quercus robur* L. and *Quercus petraea*, Liebl) and one no-tree grassland was carried out. Both analysed grasslands have approximately equal areas (Figure 1).

Figure 1. The outline of the grassland with and without trees and the location of the floristic surveys (Google Earth Pro, 2019)

The latter category of land was delimited and taken in the study as a comparative area (control) with the grassland with trees. Both areas under study are part of much larger grasslands, these portions being representative of the two types of grassland selected. Permanent grassland with oak and sessile oak is part of a tree pasture located west, north-west of Herculian, with an area of about 82 ha and bordering on the west a forest body of about 95 ha, from which it is likely to have broken off. The contour of the two areas taken in the study and the position of the floristic surveys within them were determined using GPS technology (Figure 1).

The trees in the area under study were fully counted, measuring the diameter of the trunk at 1.30 m with dendrometer, the height of trees and the pruned stem with caliper and the diameter of their crown projection in two directions with tape measure (Figure 2).

Figure 2. Tree inventory within the grassland with trees

The density of trees within the perimeter of the grassland with trees was determined as the ratio of the number of trees identified during the field work to the area of land studied. All trees counted from the survey area were numbered. The graphic representation of the spatial structure of the tree-pasture profiles was done using the PROARB software (Popa, 1999).

The records of the forestry works carried out in grassland with trees have been taken from the data centralized in the silvopastoral management plan in force.

In both categories of grassland, 7 floristic surveys were made on 100 sqm (Figure 1) areas. The distribution of the test surfaces has been randomized to comprise approximately the entire area of the perimeter being studied.

The floristic surveys within grassland with trees, having circular shape, were carried out under the tree canopy, being located midway between the crown edge and the tree trunk. In the grassland without trees, the floristic surveys had the shape of square.

Soil samples were taken at a depth of 0 to 10 cm with an pedological auger and analyzed in the laboratory and the results obtained were interpreted according to the methodology developed by the National Institute for Research and Development for Pedology and Agrochemistry (Stoica et al., 1986; Florea et al., 1987).

For the determination of the quality of the feed consumed by the grazing animals, approximately 200 g of green grass was taken from each sample area, which was analyzed in the quality laboratory of the Research-Development Institute for Grassland Brașov using the NIRS (Near Infrared Reflectance Spectroscopy) method. The results obtained were interpreted by the standard feed quality classes and summarized in a table of optimal values (Table 1).

Table 1. Optimum values of the nutritional parameters of the feed

Nutritional parameters	Optimal contents
Crude protein	16-18%
Neutral detergent fiber	45-50%
Acid detergent fiber	28-32%
Crude fiber	20-30%
Lignine detergent acid	< 6%
Digestibility	≥ 65%

The yield (qualitative and quantitative) of the two types of grassland has been determined by a new method (Marușca, 2019), the basis of which is the study of the plant cover (Marusca et al., 2020 a, b).
In this respect, floristic surveys were achieved by directly assessing the percentage share of species (P, %) in the grass cover in order to be able to continue to perform calculations on pastoral value, production index and useful green mass production (t/ha).
The pastoral value (VP) has been calculated according to the following formula:

$$PV = \Sigma P\ (\%) \times F/9, \quad (1)$$

where F is the feed quality index (Kovacs, 1979, Păcurar & Rotar, 2014, Marușca, 2019).
The assessment of PV is as follows:

- 0-5 degraded grassland;
- 5-15 very weak;
- 15-25 week;
- 25-40 mediocre;
- 40-60 medium;
- 60-80 good;
- 80-100 very good.

The production of useful Phytomass or green feed mass was then calculated, establishing a weighted production index (Marușca, 2019). The final assessment of the production of green fodder mass was made by multiplying the production index by other indicators established in the grassland experiences. In order to determine whether there is statistical assurance for the production of green feed mass, variance analysis was performed using standard techniques and differences between the media were compared with the Duncan test.

RESULTS AND DISCUSSIONS

The areas under study, situated on slopes of low to medium slope (5-25%), at altitudes of 500 to 650 m, are in the basin of the stream Baraolt, a right-hand tributary of Olt (Posea & Badea, 1984). The watercourse**,** which delimits the grassland with trees and the one without trees, is the stream of Fruntea Popii, often without the water, which after winter with abundant snow or rich rain, when the flow of the stream increases, flows into the stream Baraolt.
From a climate point of view, the surveyed area is characterized by the following parameters:
(i) annual average temperature of 7.6ºC;
(ii) average growing season of 170 days;
(iii) annual average precipitation of 584.1 mm;
(iv) annual potential evapotranspiration of 599 mm;
(v) percentage of windy days of 72%, and calm days of 28%;
(vi) annual De Martonne index of 33.1 (http://www.meteoromania.ro).
The soil types identified in the analyzed territory are of the cambisols class, namely eutricambisol and districambisol (***, 2017).
The soil supply of nutrients directly influences the flower composition of the grassland, thus the results of the soil samples analysed reveal relatively large differences in trophicity, which is higher in the grassland with trees than in the one without trees (Table 2).
According to the classification of indicators for the assessment of the nutrient supply of soils, the amount of nitrogen contained in tree-free grassland is at an approximately normal level (0.21%), compared to that in grassland with trees where it is very high (3.78%), (Lixandru et al., 1986). For the areas under study and in view of the acid reaction of the soils and the high erosion of the grassland without trees, the amount of phosphorus contained in the soil is very low (4.4 ppm), as opposed to that in grassland with trees where it is very good (78.4

ppm), the phosphorus deficiency of the soil affecting the content of plants in nutrients. The provision of potassium soil for tree-free grassland is good (181.0 ppm) and for tree grassland very good (308.0 ppm). The plants absorb all these nutrients contained in the soil throughout the growing season with different intensities depending on the phenophase. Therefore, the deficiency of any nutrient in the soil has the effect of slowing down or stopping plants growth, which leads to insufficiency or lack of feed to the grazing animals.

Table 2. Agrochemical values of the soil in the grassland with trees and in those without trees

Specification	U	1.Grassland without trees	2. Grassland with trees	Dif. 2-1 +, -	%
pH	ind.	5.70	5.20	-0.50	91
Humus	%	4.19	6.20	+2.01	148
Nitrogen index (N)	%	0.21	3.78	+3.58	1809
Mobile Phosphorus (P)	ppm	4.40	78.40	+74.00	1781
Mobile potassium (K)	ppm	181.00	308.00	+127.00	170
Amount of exchangeable bases (SB)	me/100 g	18.00	13.60	-4.40	76
Hydrolytic acidity (Ah)	me/100 g	6.00	8.70	+2.70	145
Cation exchange capacity (CEC)	me/100 g	19.90	22.30	+2.40	112
Base saturation degree (BS)	%	75.00	61.00	-14.00	81
Interchangeable aluminum	me/100 g	0.26	0.12	-0.14	45

The forest species component of the grassland with trees consists of large oak and sessile oak aged between 80 and 120 years. They mainly play a balancing role, stabilizing the ecosystem, bringing the following benefits to grassland: improve microclimate conditions, prevent erosion, facilitate the flow of water and nutrients, provide shelter and protection for animals, fix carbon, and beautify the landscape (Olea & San Miguel-Ayanz, 2006; Ficut et al., 2018).

With the optimum density of trees on grassland, their shadow and the moisture that they can hold in the soil thanks to the root system and wide crowns, contribute to the development of a diverse, rich plant cover, while also contributing to the production of high-quality feed (López-Carrasco et al., 2015; López-Sánchez et al., 2016).

In the grassland with trees 171 trees were counted, which means a density of 14 trees per hectare. That value is at the lower limit of the density of pastures with oaks in countries with tradition in development of pasture with tree, such as Spain, Portugal, Italy and Greece. Here the number of trees per hectare varies from 10 to 40 for the first countries and from 10 to 100 for the last two countries (Eichorn et al., 2006).

The average diameter of the trunk at 1.30 m, the average height of the trees and the average surface of the crown projection are important both for their influence on the crop mat and for the function of production of the tree component of the agroforestry system, even if the latter is secondary. The values of these biometrics are given in Table 4.

The diameter of the trunk at 1.30 m, the height of the trees and the surface of the crown projection are characteristics which influence the rich of the plant cover or the wooden production on the pasture, even if the last one is secondary. The average values of these parameters are given in Table 3.

The sum of tree crown projections has also been calculated, and the 171 trees from the area under analysis are estimated to cover grassland at 22%.

This percentage may in fact be lower, since it has been found that, although most trees are sparse, there are also grouped trees whose crowns projections are partially overlapping (Figure 3).

Table 3. Biometric characteristics of forest species in grassland with trees

Feature analysed	Sessile oak	Oak	Total
Number of trees / % of total	132/ 77%	39/ 23%	171/ 100%
Medium diameter (cm)	67	75	69
Medium height (m)	18	20	19
Medium surface of the crowns projection (sqm)	145	186	154
The sum of the crown projections (sqm)	19182	7252	26434

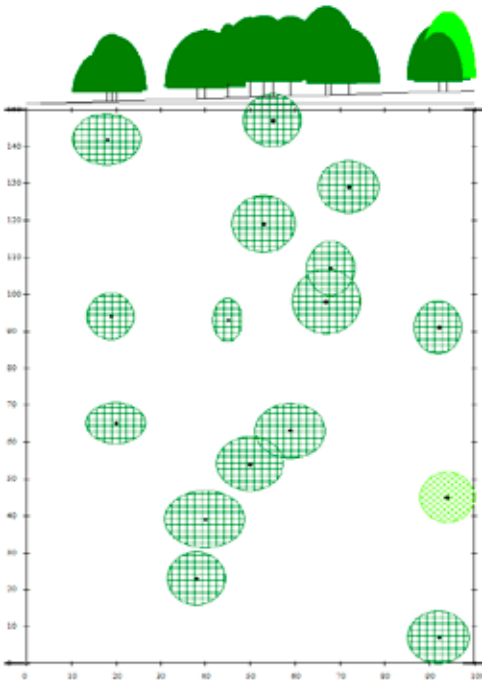

Figure 3. Vertical and horizontal graphic expression of a portion from the Herculian grassland

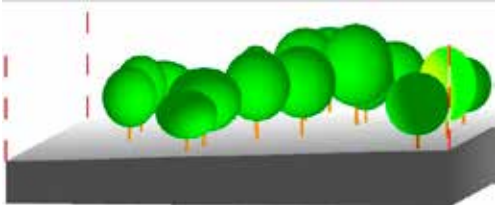

Figure 4. 3D profile of a portion from the Herculian sessile and pedunculate oak grassland

The diameter of trees has been found to vary, with values ranging from 47 cm to 114 cm. This variation is explained by the fact that the cutting of trees was not carried out taking into account the provisions of forest management projects, but that trees with high economic value were mainly extracted. Variations are also recorded in the case of crowns projections related to the diameter classes, which shows the way the trees are grouped on the pasture, some grouped (they have diameters and crowns projections small), some scattered (they have diameters and crowns projections bigger) (Figure 5). The higher value of the recorded parameters (diameter, height, surface of crown projection) at pedunculate oak in relation to the sessile oak, recommend that oak to be used when trees are introduced on grassland, the last one proven to be a more productive species. In addition, it will provide shelter and shade to animals grazing during the growing season on a larger area.

The phytosanitary status of the trees in grassland with trees is generally good and, where appropriate, it is proposed that the whole area be covered by hygienic work.

According to the data extracted from the silvopastoral management project, about 16m^3 of firewood were harvested in five years. In the autumn of 2021, approximately 13 tons of acorn were harvested from the tree pasture, which was exported to Hungary for the production of seedlings in nurseries. Both aspects also demonstrate the social functions that the grassland with trees perform.

The presence of trees on grassland causes changes in the flower composition of the herbaceous cover, in the spatial structure and distribution of herbaceous communities, leading to the emergence of micro-ecosystems of different species not found on sunlit grassland (López-Sánchez et al., 2016).

Trees, as well as the level of loading of grassland with animals for grazing, are very important factors in maintaining the diversity of grassland. Exceeding the optimal of cattle and/or sheep on grazing may lead to the creation of predominantly nitrophilous micro-ecosystems, which is undesirable for the production of high-quality feed (Moreno et al., 2016).

As regards the grass cover, the floral composition and productivity (qualitative and quantitative) in the grassland with and without trees are shown in Figure 6 and Table 4.

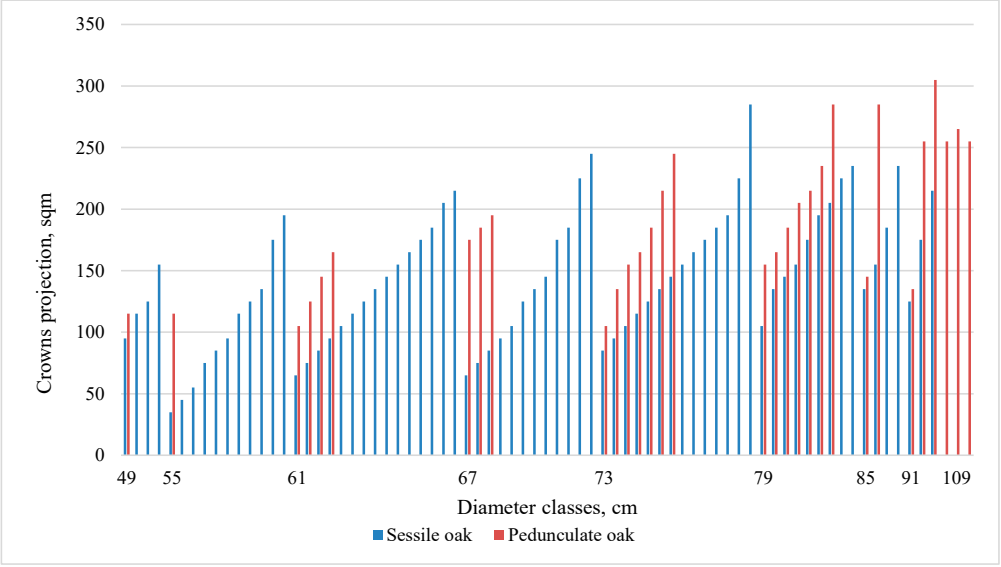

Figure 5. Variance of the crowns projection according to the diameter of the trees

Table 4. Floristic composition and productivity of grass from the no-tree grasslands and with trees

Species	Presence (class)		Participation %				Indices	
	Grassland without trees	Grassland with trees	Grassland without trees	Grassland with trees	Dif. + -	%	F	M
Cover	X	X	97.8	95.1	-3.5	96	X	X
Poacee								
Agrostis capillaris	V	V	10.7	12.3	1.6	115	7	6
Anthoxanthum odoratum	IV		2.7	0.0	-2.7		7	5
Cynosurus cristatus		IV	0.0	1.4	1.4		5	3
Danthonia (Syeglingia) decumbens		I	0.0	0.1	0.1		7	4
Deschampsia caespitosa		II	0.0	1.1	1.1		4	3
Festuca pratensis		I	0.0	0.3	0.3		3	0
Festuca rubra	V	V	29.0	44.0	15.0	152	9	8
Festuca valesiaca	III		2.0	0.0	-2.0		5	3
Lolium perene		IV	0.0	5.1	5.1		9	8
Nardus stricta	V		14.1	0.0	-14.1		3	0
Poa pratensis	III		1.0	0.0	-1.0		8	6
Total			59.5	64.4				
Fabaceae								
Genista sagittalis	III		1.3	0.0	-1.3		3	0
Genista tinctoria	III		0.9	0.0	-0.9		3	0
Lotus corniculatus	V	III	2.6	0.6	-2.0	22	8	6
Trifolium pratense	V	V	2.0	1.7	-0.3	86	8	7
Trifolium repens	V	V	10.7	11.1	0.4	104	8	5
Total			17.4	13.4				
Other families								
Achillea millefolium	IV	III	2.1	0.9	-1.3	40	6	4
Agrimonia eupatoria	I	III	0.1	0.6	0.4	400	3	0
Alchemilla vulgaris	III		0.6	0.0	-0.6		6	4
Carduus achantoides		III	0.0	0.7	0.7		3	0
Carlina vulgaris	I	III	0.3	0.4	0.1	150	3	0
Centaurea phrygia		III	0.0	0.4	0.4		4	6
Centaurium umbelatum		II	0.0	0.3	0.3		3	0

Species	Presence (class)		Participation %				Indices	
	Grassland without trees	Grassland with trees	Grassland without trees	Grassland with trees	Dif. + -	%	F	M
Cichorium intybus		II	0.0	0.4	0.4		5	6
Crataegus monogyna	III	I	0.4	0.1	-0.3	33	3	0
Daucus carota	III		0.4	0.0	-0.4		6	5
Euphorbia cyparisias	III		1.6	0.0	-1.6		1	0
Fragaria viridis	III	III	1.1	0.6	-0.6	50	4	1
Galium cruciata	I	I	0.1	0.1	0.0	100	3	0
Juncus conglomeratus	I		0.1	0.0	-0.1		3	0
Leontodon autumnalis	I	V	0.1	2.1	2.0	1500	5	3
Luzula campestris	III		0.6	0.0	-0.6		4	2
Plantago lanceolata	V	V	2.9	2.1	-0.7	75	6	1
Plantago major		V	0.0	1.7	1.7		5	3
Plantago media	V		1.7	0.0	-1.7		6	2
Polygala vulgaris	II		0.3	0.0	-0.3		4	1
Potentilla reptans	II	II	0.3	0.3	0.0	100	3	0
Prunella vulgaris		IV	0.0	1.4	1.4		4	2
Pteridium aquilinum		I	0.0	0.7	0.7		3	0
Pyrus piraster	I	I	0.1	0.1	0.0	100	3	0
Ranunculus repens		I	0.0	0.1	0.1		1	0
Rosa canina	III	IV	0.6	1.0	0.4	175	3	0
Taraxacum officinale	V	III	3.6	1.1	-2.4	32	7	3
Thymus montanum	III		1.9	0.0	-1.9		4	2
Urtica dioica		II	0.0	1.9	1.9		3	0
Veronica chamaedrys	III		0.4	0.0	-0.4		4	2
Viola canina	V		1.1	0.0	-1.1		4	1
Total			20.9	17.3				
Total species (no.)			34	31	-3	91	X	X
From which: - fodder			21	18	-3	86	X	X
- not fodder			13	13	0	100	X	X
Participation of fodder species			77.6	87.6	+10	113	X	X
Participation of harmful species			20.3	7.5	-12.8	37	X	X
Vegetation gaps (bare soil)			2.1	4.9	+2.8	233	X	X
Pastoral Value			58.4	68.7	+10.3	118	X	X
Phytomass index			3.69	4.75	1.06	130	X	X
Fodder production (t/ha)			9.14	12.83	+3.69	140	X	X

Figure 6. Herbaceous cover in grassland without trees

The indices of presence I, II, III, IV, V indicate the existence of a certain species, in a certain number, in the analysed floristic surveys.

The non-valuable (pastoral) species *Nardus stricta* which is present in all the test areas from trees-free grassland, is 14.1% absent in the grassland with trees. Instead of this weed, *Lolium perenne* develops with more than 5%, the *Festuca rubra* is extended from 29.0 to 44.0%. *Agrostis capillaris* has a 15% higher participation rate in the grassland with trees than in the tree-less grassland and in the shadow areas there is also *Cynosurus crystatus*, which is quite well consumed by the animals. As regards legumes, the percentage of participation in the grass cover in the tree-free grassland is higher than in the grassland with trees, but the difference is given by two species harmful to the grass, not consumed by the animals, namely the *Genista sagittalis* and the *Genista tinctoria*. *Lotus corniculatus* has a relatively small percentage in the grassland with trees, which prefer to the more acidic and

poorer soils as those in the sun-filled in the tree-less grassland (Ciocârlan, 2009).

In general, the valuable feed species on the fields benefiting from the shadow of the oaks exceed 13% of the grass cover participation compared to those existing on open land, and the harmful ones are 63% less in the tree-grassland than in the trees-less pasture. Of course, all these values influence the quality of the plant material consumed by the grazing animals.

The quality index as the feed value, assessed according to the floristic indices in the grassland with trees reaches 68.7, 10.3 higher than in the enlightened grasslands. Indeed, the difference is not very large, the appreciation for the pastoral value of the pasture without trees being medium, and for grassland with trees good, but it gives us the information that the quality chemical parameters of the forage have much higher nutritional value in the silvopastoral system than in the control surface (without forest vegetation).

The production of green fodder mass amounts to almost 13 t/ha on the shaded land compared to 9.14 t/ha on the sunlit grassland, i.e., 40% more under the protection of tree shadows.

The amount of green fodder mass per variant and each floristic survey, together with the mean of the variance, is given in Table 5.

Table 5. Production of fodder from floristic surveys made in grassland with trees and no-trees grassland

Green mass production (t/ha)								
Variants	Repetitions (Floristic surveys)							Mean of variance
	1	2	3	4	5	6	7	
No trees grassland	9.53	10.92	8.35	5.43	8.02	11.83	10.03	9.14
Grassland with trees	14.28	10.79	13.58	11.57	14.56	11.34	13.45	12.83

The quality of feed species refers to how well the feed produced on grassland is consumed by the animals and how efficient the feed nutrients are to be transformed into high-quality animal products (Fulgueira et al., 2007). There are six biological and technological factors that influence the nutritional quality of feed: type of grassland (with woody vegetation and without), soil fertility, grassland composition (percentage of grasses and legumes), optimal loading with animals, exploitation and maintenance of the grassland. The first three factors have been analysed above and the last three, as a result of the findings at the time of the field works, are respected according to the provisions of the silvopastoral management in force.

For green mass samples collected from the oaks silvopastoral system and the no-tree grassland, the following chemical quality parameters of the feed have been analysed: crude protein; crude fibre; ash; fibre fractions: acid detergent fibre, lignin detergent acid and neutral fibre; digestibility of dry matter; digestibility of organic matter. Table 6 contains information on each chemical component contained in the feed, analysed independently.

The average of each variable, the minimum and maximum limit of each parameter analysed and the level of data scatter (standard deviation) is given. In this way, from the table we note that for the raw protein variable, the maximum value is 17.2, the minimum value 11.1, and the average value is 14.0, from which we can conclude that the raw protein has a quite high value, the feed quality class is excellent.

Analysed separately for each variant, crude protein of the tree-less grassland reaches almost 13% and increases to over 15% in grassland with trees. Similarly, the digestibility of dry matter and organic matter grow on the tree grassland from 18 to 21% due to the superior quality of the fodder obtained on these surfaces (Table 6).

Table 6. General data and differences in chemical quality parameters of forage, from grassland with trees and grassland without trees

Chemical parameters for forage quality	Minimum value	Maximum value	The average of the 14 cases analyzed	Standard deviation	Content %			%
					Grassland without trees	Grassland with trees	Dif. + -	
Crude protein	11.1	17.2	14.0	1.89	12.59	15.43	2.84	123
Ash (ASH)	8.2	11.8	9.8	0.81	9.39	10.30	0.91	110
Crude fiber (CF)	28.8	36.4	32.6	2.17	33.80	31.54	-2.26	93
Acid detergent fiber (ADF)	33.2	41.4	37.1	2.22	38.37	35.74	-2.63	93
Lignin detergent acid (LDA)	3.2	5.6	3.8	0.60	4.09	3.51	-0.57	86
Neutral detergent fiber (NDF)	56.7	68.4	62.3	3.31	64.36	60.19	-4.17	94
Digestibility of the dry matter (DMD)	44.5	64.9	55.0	6.27	50.41	59.51	9.10	118
Digestibility of the organic matter (DMD)	40.9	61.8	52.3	6.47	47.31	57.23	9.91	121

The feed quality indexes of the grassland with oaks are clearly better than those of grassland without forest vegetation. Given that there is a balance between the values of the nutrients contained in the grassland with trees, the production and the quality of the livestock is certain.

CONCLUSIONS

The forest vegetation in the pastures with trees consists of sessile oak and pedunculate oak, the sessile oak being the predominant species. From the analysis of the forest component of the silvopastoral system found that the trees are not evenly distributed, so that the pasture does not benefit from shade evenly. It should be noted that pedunculate oak has developed trunk sizes and crowns larger than sessile oak, compensating in a certain proportion for the smaller number of specimens than the sessile oak. The density of 14 trees per hectare provides optimal conditions for the development of grassy cover and shade for animals that graze during the growing season.

The comparative study between the pastures with trees and the pastures without trees showed that in the pasture with trees the values of the three most important nutrients in the soil composition, namely: nitrogen, phosphorus and potassium, are much higher than the grassland without trees, but without exceeding the maximum limit necessary for the development of herbaceous vegetation. The presence of trees and manure left by animals in their shade during the rest periods, increase the amount of nitrogen and phosphorus in the soil compared to the forest-free grassland. The vegetal cover is 13% richer in forage species than the tree-less pastures. Also, the production of green fodder mass is 40% higher and the pastoral value 13% higher in the wood pasture compared to the tree-less pasture. From the quality analyses of the fodder grassy species, it results that the high values of the fibre concentration (33.8%) of the pasture without trees give a low nutritional value to the fodder obtained on this pasture, which is why the digestibility value is also lower by about 82% in the pasture without trees compared to the pasture with trees.

The grassland with trees were maintained in a pretty good condition compared to the grassland without trees where, due to the practice in time of the unreasonable grazing and the non-application of some agrotechnical works absolutely necessary to improve the floristic composition, they led to the decrease of the quantities of mineral substances on the profile and to the accentuation of the soil acidity, conditions in which *Nardus stricta* (species without pastoral value) extended over the entire surface, slowly removing the valuable species. Also, through unrationed grazing, anthills of vegetal origin are formed, on the dense bushes of some grasses, such as *Deschampsia caespitosa*, understood after their trampling by animals and which lead the

grassland to a state of degradation by reducing to the point of elimination the valuable herbaceous species. The data presented are arguments for maintaining and caring for trees on pasture. In order to ensure the continuity of trees on pastures, given that existing trees are not evenly distributed over their stretch, it is necessary to plant new specimens in the open spaces and to gradually replace the dried trees.

ACKNOWLEDGEMENTS

This research work was carried out by the project PN 19070403 "Establishment of new agroforestry systems in Romania", financed by the Ministry of Research, Innovation and Digitization through the Nucleus Program

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