RESEARCH ON REHABILITATION OF THE NATURAL GRASSLANDS IN THE CONDITIONS OF THE NORTH BARAGANU PLAINS

Aurica SOARE, Gh. VOICU

[1]"Dunărea de Jos" Galati University - Faculty of Engineering Brăila, 29 Calea Călăraşilor, Brăila
Corresponding author: aurica.soare@gmail.com, voigeor_vg@yahoo.com

Abstract: *Such research has been conducted in order to establish the main measures to improve the quality and quantity of forage base areas operated by grazing the Plain Brăilei in conjunction with climatic features of the area. Methods for improving technology are based on establishing specific culture in the Baraganu North area Plain and the efficiency of these areas by placing them in intensive exploitation circuit, with herds of cattle, sheep and goats owned by family farms. Case study was performed on the natural meadow of the Territorial Administrative Rosiori Unit,of 63 hectares that was the research module, afterwards will be reported the outcome research in the entire area of grassland in the county. With Braila county area of grassland / cattle ran diseases as the basis for livestock forage for cattle and sheep / goat heads in the number of 63,115 sheep and 26,451 head respectively 255,109 head of goats is 28,905 ha. Such animal cargo area is about 0.5 ha per head in non-irrigated conditions with an output of 836,549 tons / year green mass. It is noted insufficient amount of green mass obtained from such areas leading to radical action agro-based zonal development strategy and an appropriate technical level. This work underpins the development of a county strategy, adapted to the particularities of local soil and climate, specified to all territorial administrative units in hand, placed in the specific Baraganu North Plain area. In the present study stood the developing a feasibility study which included the following: a pedological study, a thorough search of floristic composition of the area, technology recommendations and the drawing up of a technological form. A review of natural grasslands in general and in particular the Territorial Administrative Unit Roşiori carried out: a geotechnical study, physical study and geographical conditions of the area and study Floristics. The results obtained from the study were specific agro-technology development specific habitat looked suitable conditions, by making the statement and estimate of technological tasks, but also a cost-benefit analysis. Sustainable development of rural areas as a response of contemporary society demanded for support of ecosystems services is given largely as biodiversity conservation and intensive management of pastures. In this context, this paper addresses the study of natural grasslands ecosystems Plain Braila, in this new perspective.*

Key words**:** *floristic composition, grazing, forage base*

INTRODUCTION

The surface occupied with meadows at country's level is of 4,9 mil hectares, out of which 3,4 mil hectares are pastures, and 1,5 mil hectares are hayfields. Out of the meadows surface, 97% is located in private domain, out of which 43,7% belongs to administrative territorial units and 56,3% belongs to physical persons, and the balance of 3% is in public property.

Out of the total surface of meadows that belongs to administrative territorial units, 90% is represented by the communal grazing grounds (communal pastures), surfaces on which there had been applied a low volume of ameliorating works, with negative effects on the green mass production, which is on average 4-5 t/ha, equivalent of 1-1,5 t hay/ha. The green mass production that can be achieved, ensures on average over 56% out of the fodder requirement, and in the hilly and mountainous areas, the fodder requirement is ensured in ratio of 65-70%.

In the conditions of Brăila County, the meadows/ grazing grounds surface affected as fodder basis for the live stock of cattle and ovine / caprine, in number of 63115 heads,

respectively 255109 ovine heads and 26451 caprine heads is of 28905 ha. Accordingly, the load on the surface with animals is about 0.5 ha/animal head under conditions of no irrigation, with a production of 836.549 t/year green mass.

It is remarked the insufficient quantity of green mass obtained from these surfaces, this leading accordingly to taking some radical agro-technical measures, based on a zonal development strategy and on an adequate technical plan.

The surface of communal grazing grounds from Roşiori parish area is of 63 ha, and the animals' number is of 3691 heads, out of which 1309 bovines' heads and 2382 ovine's and caprine heads. The animals number, respectively bovines', represents 3.25 % out of total number of bovines at County level, and the ovine and caprine number represents about 0.95% from the total number of ovine and caprine at Brăila County level. This shows that the orientation of the farmers from the area is directed to converting the vegetable production into animal production, but the productive potential of the surfaces of fodder basis does not cover the food requirements.

Increasing the animals' number and their production represents number one priority in zootechnics development, thus leading to achieving an equilibrium between the vegetable and animal production (at this moment, the report between the animal and vegetable production is of 0.35/0.65). The qualitative and quantitative improvement of the fodder basis surfaces and especially of the communal grazing grounds, would lead to making efficient animals' breeding, finally leading to zonal and regional economic development.

The floristic composition of meadow is influenced in time by the frequency of grazing and fertilization regime. The exploatation of fertile meadows shouldn't be intensified, beyond their potential of productivity. (VIDRIM M,, CROP J., TRDAN S., ELER K.)

The floristic composition of meadows is strongly dependent on applied management. (MOOG D., POSCHLOD P.,. KAHMEN S, and SCHREIBER K.)

Proposing the solutions and measures regarding the improvement and usage of the meadow subject to research, requires knowledge on the pastoral background under all aspects: surface, ecological conditions (landscape, climate, soil), floristic composition, etc.

The analysis of the general situation of the natural meadows, generally and particularly of the Roşiori administrative territorial unit was achieved by performing a geo-technical study, a study of the physical-geographical conditions of the area and a geo-botanical study. The geo-technical study has as purpose identifying the soils from the territory pedologically mapped, supplying data regarding the chemical properties of the soils, the limitative factors that influence soil's fertility, as well as the optimum mixture of constituent species that can be seeded.

Grazing modifies more in the floristic composition of meadows in the case of soils formed on calcareous rocks than the meadows on soils formed on other types of rock. (BAŞNOU CORINA., PINO J., SMILAUER P.)

The soils coating characteristic in Brăila County is represented by soils from *Cernisoils* class (about 50%) in high areas, *Protisoils* class in water meadows 33%, *Hydrisoils* class about 13% and *Salsodisoils* class about 4%. On the territory of Roşiori parish, there are met soils from *Molisoils* class (typical chernozem, cambic chernozem, gleic chernozem) and from *Salsodisoils* class (soloneț). The physical-geographical conditions of the area, along with the edafic factor, decisively influence the quantity and quality of green mass obtained from the grazing grounds' surface.

MATERIAL AND METHODS

The field on which it is situated the meadow under study is comprised within zonal units, respectively steppe area.

Steppe area comprises Eastern Bărăgan (20-100 m altitude), the south of Moldova and the center of Dobrogea (100-200 m altitude). This area is characterized through annual average temperatures of 10.4-11.5°C, annual precipitations of 350-500 mm, the predominant soils being chernozems, grey and litic soils.

The climatic characterization of the area was performed based on the climatic data recorded at Brăila Meteorological Station.

On the surface analyzed, 5 soil's profiles had been performed up to the depth of 180 cm, these profiles being analyzed from morphological point of view, identifying the horizons, determining their thickness, their color by using Munsell atlas, their texture and soil samples had been taken in order to determine the main chemical attributes (pH, humus content, mobile phosphorus, mobile potassium, total content of soluble salts) and of their physical attributes (apparent density, density, porosity). Also, there had been determined by calculation the main hydro-physical indices of the soil (field capacity for water, fading coefficient, hygroscopicity coefficient, capacity of useful water.

In the laboratory of Brăila Pedological and Agrochemical Studies' Office (OSPA), the following physical and chemical analyses were performed according to the methodology in force (Florea N.) and the interpretation of the values obtained was performed according to the scale used by OSPA Brăila.

The pH in water extract 1/5 potentiometrically determined; $CaCO_3$ through Scheibler method; the humus through Schollenberger method; *P2O5 mobile* was determined through Egner-Riehm-Domingo method, in ammonium acetate lactate solution; *K2O mobile* was determined through photometric method in Egner-Riehm-Domingo extract; *the total content of soluble salts* was determined through conductometric method in soil extract in soil:water ratio of 1:5;

The granulometric analysis was performed through treating the soil sample according to Kacinski method and separating the granulometric fractions through screening and dropping.

The works regarding the inventory and mapping of the meadow found under study developed in three stages: preparatory, on site, at the office. In the preparatory stage, there have been procured the documentations regarding the surface, ecological conditions, way of usage.

In the on site stage, there had been performed determinations through methods of identification of the types of specific meadows, respectively the planimetrical method; it was determined the floristic composition of the meadow analyzed. There had been performed 5 readings, using a frame with side of 0.5 m, split into 25 squares; after the frame was positioned, it was first established the percentage of blanks and then there had been determined the plants present and the surface occupied by each plant, within each square, in percentages. (GEAMĂNU LIDIA). It was calculated the frequency specific to each species identified in the floristic composition, by using the formula: $FS\ \% = Ni \times 100 / Ntot$ where:

Ni= the number of points in which a species is met; Ntot= total number of observation points;

Then it was determined the pastoral value (Vp), which is a synthetic index of appreciation of the meadow's value, using the geobotanical value, according to the following formula: $Vp = \Sigma A \times Is / 100$ where:

A= species coverage (%); Is= specific quality index

The pastoral value allows calculating the pasturage capacity (Cp), without determining the pastures' production, according to the following formula: $Cp = Vp \times 0.4\ (0.6)$

RESULTS AND DISCUSSIONS

Achieving maximum productions with a high degree of food conversion is mainly determined by two factors, namely: the genetic potential of the animals and the quantity and

quality of the fodder administrated. The fodder basis of Brăila County is structured according to table 1 on a surface that comprises over 1/3 from the arable surface of the county.

Table 1

The fodder basis of Brăila County

Culture	Surface (ha)		Production (tons)	
	2006	2007	2006	2007
Lucerne for hay and green mass	17.002	18.003	233.298	187.472
Corn grains	88.333	57.693	344.043	78.042
Plants for ensiling	944	299	20.080	3293
Species of old and new perennial plants	17.585	-	236.213	-
Species of other perennial plants for hay and green mass	583	238	2.915	1.247

From table 1 it results that the surface occupied by the fodder basis is totally insufficient for the existing number of animals and naturally, the difference should be covered by the productions of green mass achieved on the meadows and grazing grounds.

Roşiori communal territory is part of Câmpia Română (Romanian Plain), Câmpia Brăilei (Braila Plain) sub-region. Geomorphologically, the landscape is relatively uniform, represented by flat, widely fields, which are characterized by a superficial, weak draining of the dripping waters, usually to the interior lowlands.

Climatic characterization of the area shows that the annual average temperature of the territory is of 11ºC, the sum of temperatures in the vegetation period (1st of March – 31st of October) is of over 3976ºC with a daily average per interval of 16.2ºC, and the sum of the temperatures in the period between 1st of May – 31st of October is 3489ºC, with a daily average per interval 19ºC.

Annual average precipitations sum up 460.5 mm, the biggest quantities of precipitations falling at the beginning of summer (the month of June - 61 mm), and the smallest quantities in the month of February (24.3 mm) and March (28.3 mm). Like the thermal regime, the precipitations regime also reflects the continental character of the climate, meaning that they fall in variable quantities from one year to another and they are unequally allocated during the year, this representing a limitative factor for the cultures from this area.

Following to the mapping, the soil from the perimeter analyzed is typical loamy chernozem, made up in the conditions of plain being slightly sloped, on loess deposits, ground water at 3.1-5.0m, spontaneous steppe vegetation.

The soil's profile is Ap (0-27 cm)-Am (27-58 cm)-AC (58-73 cm)-Cca$_1$ (73-103 cm)-Cca$_2$ (103-152 cm)- C (152-200 cm).

The structure is small glomerular, well developed at the level of Ap and Am horizons.

The texture is medium, loamy, uniform on entire soil profile, the clay content varying from 30,02% in Ap to 18,07% in C. The granulometric composition ensures to the soil a total porosity which varies between 56,3-52,8% on the depth of 0-73 cm, value which determines a total good porosity of the soil. The small and medium glomerular well developed structure determines forming water reserves in depth. The results of the determinations regarding the physical attributes are presented in table 2.

The soil's reaction is slightly alkaline on the entire profile of soil. The humus content (%) is higher than in Ap horizon and decreases in Am and AC horizons. The humus reserve on the depth of 0-50 cm is of 156 t/ha. The content in mobile phosphorous (ppm) varies from 46 ppm in the Ap horizon at 39 ppm in Am horizon which shows a poor supply with mobile phosphorous. The content of mobile potassium (ppm) is average in Ap and decreases in Am. The total content of soluble salts has values bellow 100 mg/100 g sol, on entire soil profile that

shows that the soil is not salinized. The results of the determinations performed in order to establish the chemical attributes are presented in table 3.

Table 2

The physical attributes of the typical chernozem soil, formed on loamy loess, under plain's conditions, from Roşiori area, Brăila County

Specification / Horizons	**Ap**	**Am**	**AC**	**Cca1**	**Cca2**	**C**
Depths (cm)	0-20	30-50	58-73	80-95	120-135	165-180
Coarse sand (2,0-0,2mm)%	0,05	0,05	0,04	0,01	0,01	0,06
Fine sand (0,2-0,02mm)%	44,44	42,08	45,75	47,03	46,16	56,94
Dust (0,02-0,002mm)%	25,49	31,29	27,23	27,94	30,00	24,93
Clay (bellow 0,002mm)%, out of which:	30,02	26,58	26,98	25,02	23,83	18,07
Physical clay (bellow 0.01mm)%	37,93	43,56	39,27	39,03	33,57	25,81
Texture	LL	LL	LL	LL	LL	LL
Density (g/cm^3)	2,52	2,52	2,56	2,58	2,58	-
Apparent density (DA g/cm^3)	1,16	1,18	1,25	1,37	1,39	-
Total porosity (PT%)	56,3	55,2	52,8	49,3	48,6	-
Aeration porosity (PA%)	23,8	23,6	19,6	12,0	11,8	-
Higroscopicity coefficient (CH%)	7,4	6,6	6,4	6,1	5,5	-
Fading coefficient (CO%)	11,1	9,8	9,6	9,2	8,3	-
Field capacity (CC%)	28,0	26,7	25,0	23,5	22,4	-
Useful water capacity (CU%)	16,9	16,9	15,4	14,4	14,1	-

Table 3

The physical attributes of the typical chernozem soil, formed on loamy loess, under plain's conditions, from Roşiori area, Brăila County

Specification / Horizons	Ap	Am	AC	Cca1	Cca2	C
Depths (cm)	0-20	30-50	58-73	80-95	120-135	165-180
pH in water	7,81	7,87	8,05	8,16	-	-
Carbonates ($CaCO_3$%)	1,29	7,04	12,13	16,39	19,66	14,75
Humus (%)	3,58	2,49	2,14	-	-	-
Index of nitrogen	3,58	2,49	2,14	-	-	-
Humus reserve (t/ha)	156	-	-	-	-	-
P mobile (ppm)	46	39	-	-	-	-
K mobile (ppm)	225	160	-	-	-	-
Soluble salts (1:5) mg/100 g sol	-	62	71	68	83	-

Table 4

The centralizer of the readings with frame (coverage in %)

Species' name	Number of readings				Average	
	1	2	3	4	5	
Gramineous plants	**48.50**	**54.00**	**51.75**	**52.50**	**50.50**	**51.45**
Lolim perenne	1.25	1.75	2.00	1.00	1.25	1.45
Festuca valesiaca	37.25	45.50	41.75	43.25	40.50	41.65
Poa pratensis	3.25	2.50	2.75	3.00	2.25	2.75
Agropyron repens	5.50	4.25	4.50	5.25	5.00	4.90
Dactylis glomerata	1.25	-	0.75	-	1.50	0.70
Leguminous plants	**3.00**	**5.25**	**5.55**	**6.50**	**7.00**	**5.46**
Medicago falcate	0.75	1.00	0.25	-	0.75	0.55
Trifolium pratense	-	4.25	3.75	4.50	3.75	3.25
Lotus corniculatus	2.25	-	1.55	2.00	2.50	1.66
Species from other botanical families	**11.50**	**10.25**	**11.25**	**10.00**	**9.75**	**10.55**
Taraxacum officinale	11.50	10.25	11.25	10.00	9.75	10.55
Blanks	**37.00**	**30.50**	**31.45**	**31.00**	**32.75**	**32.54**
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

Based on the physical and chemical attributes analyzed, it can be concluded that the typical chernozem is very good to the culture of the perennial gramineous and leguminous species that enter into the composition of the meadows, this type of soil being part of the class of soils with increased fertility.

The results of the readings performed regarding determining the degree of coverage for each species identified in the floristic composition are presented in table 4.

So, it is observed that the dominant species in the floristic composition are gramineous plants 51.45% and out of them, the *Festuca valesiaca* species whose specific quality index is small, respectively 1, which shows it is a species with a low fodder value.

The group of leguminous plants occupies 5.46%, from this group being dominant the *Trifolium pratense* species, in proportion of 3.25%, a valuable species, whose specific quality index is 4.

With a coverage of over 10%, the *Taraxacum officinale* species also participates, species with a low fodder value, the specific quality index being 2.

The dominant species in the composition of the vegetable carpet results also from figure 1, where it is presented the specific frequency of the species met in the vegetable carpet.

Out of the analysis of the plants' species which make up the floristic composition of the meadow, it results that the dominant species identified are xerophyte species adapted for growth and development on dry soils, with neutral reaction or slightly alkaline and poor in mineral nitrogen.

The surface occupied by blanks is over 30%, which shows a meadow spoiled not only under the aspect of the non-valuable species which compose it, but also under the aspect of the degree of coverage with vegetable carpet. The low quality of the vegetable carpet is found also in the value of 1.14 of the pastoral value, which shows a meadow of mediocre quality, with a capacity of pasturage also decreased of only 0.45 UVM/ha.

By calculating the Pearson correlation index between the coverage degree and the specific frequency, we obtained a value of +0.887, that shows that between the two variables there is a correlation, this meaning that the degree of coverage is influenced by the frequency with which the species identified are met in the vegetable carpet.

From the graphic representation of the correlation between the two variables presented in figure 2, it is observed that the majority of the points are grouped, except for two which are more dispersed.

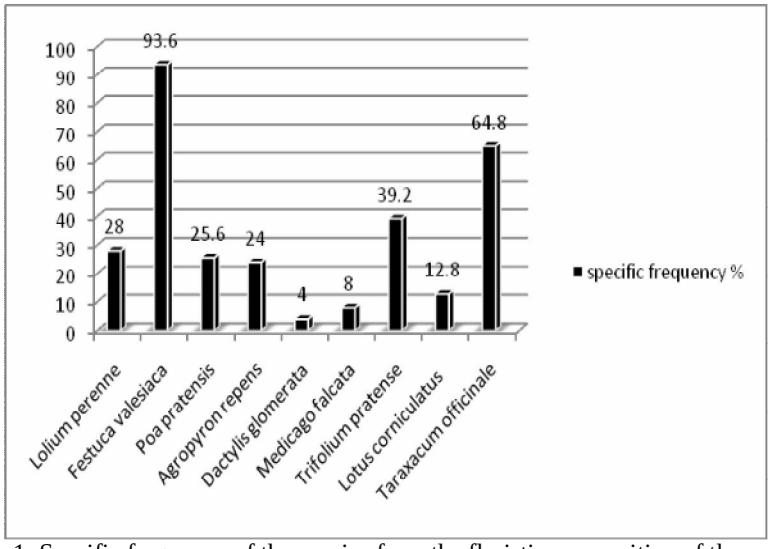

Figure 1: Specific frequency of the species from the floristic composition of the meadow

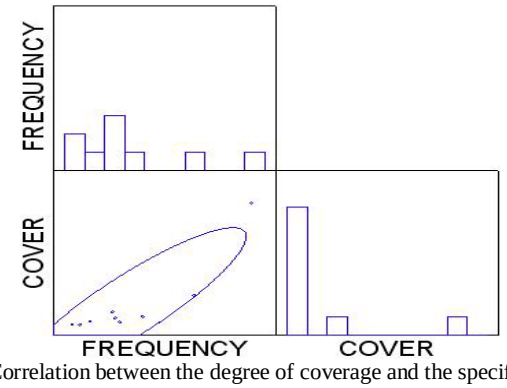

Figure 2: Correlation between the degree of coverage and the specific frequency

CONCLUSIONS

Following to analysis the pedo-climatic conditions specific to the area analyzed from the territory of Rosiori administrative territorial unit, it was observed that out of the climatic factors, the irregular allocation of precipitations during the vegetation period represents a limitative factor, but the soil identified is a soil from the category of the most fertile soils with physical and chemical attributes favorable to the growth and development of gramineous and leguminous perennial plants.

Due to the fact that the actual status of the meadow is of semi-abandonment, with a floristic carpet extremely poor in number of species, but especially of a very low quality, it is proposed to replace it with a meadow seeded with a mixture for pasture, having as components the species: *Dactylis glomerata* 58%, *Lolium perenne* 11% and *Lotus corniculatus* 31%.

The advantages of this seeded meadow are: increase in production to 25-40 t green mass/ha, obtaining a fodder with an increased degree of palatalability 90-95%, energo-protean equilibrated (protean content of 14-16%) and improvement of mineral nutrition of plants, by biologically fixing an annual quantity of 100-150 kg/ha/year nitrogen, by the leguminous plants found in mixture, contributing to reducing by approximately 20-40% the doses of nitrogen fertilizer.

The works that are recommended in order to set up a seeded meadow are the following: ploughing at the depth of 20-22cm, basic fertilization with the fertilizers based on phosphorous (50-70 kg/ha P_2O_5) and potassium (50 kg/ha K_2O), preparing the germinal bed through 1-2 runs with the combiner, followed by compacting the soil with the roller of kroskilet type, the choice for seeding some mixtures which would correspond to pedo-climatic conditions and way of usage, the seeding and then applying the maintenance works (supplementary fertilization with nitrogen 30-35 kg/ha etc, applied after the mowing for cleaning the weeds and at 5-7 days after each cycle of pasturage, repeated mowing of the vegetable residues that remain after each pasturage cycle).

BIBLIOGRAPHY

1. BAŞNOU CORINA., PINO J., ŠMILAUER P., - Effect of grazing on grasslands in the Western Romanian Carpathians depends on the bedrock type. – Preslia 81, 2009, pages 91–104.
2. FLOREA N. AND COLLAB. – Methodology of elaborating the pedological studies – Eco-pedological indices – Centre of educational material and agricultural propaganda – Editorial office of technical agricultural propaganda, Bucharest, 1987.
3. GEAMĂNU LIDIA, DINCĂ N., - Culture of meadows and fodder plants, practical works, Lito USAMV Bucureşti, 2000.

4. MOOG D., POSCHLOD P.,. KAHMEN S, AND SCHREIBER K.,- Comparison of species composition between different grassland management treatments after 25 years- Applied Vegetation Science 5(1), 2002, pages 99-106.
5. VIDRIM M,, CROP J., TRDAN S., ELER K., - Changes in floristic composition over three years of Ljubljana marsh grassland in relation to cutting and fertilising management, Acta Agriculturae Slovenica, 93-2, julij 2009, pages 193 – 199.