GRASSLAND VEGETATION FROM THE MARGINAL AREA OF TIMIŞOARA (TIMIŞ COUNTY) – CASE STUDY

I. R. NICU, Carmen Claudia DURĂU [1], Veronica SĂRĂŢEANU[1]
[1]Banat`s University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania
Corresponding author: e-mail: veronica.sarateanu@gmail.com, sch_carmen_1999@yahoo.com

Abstract. *Biodiversity analysed in global system represents the variety of the living beings species that populate the biosphere. The structure of a biocoenosis is given by the spatial distribution of the individuals and the spatial and temporal relationships set among them. In the analysis of the structure of a biocoenosis are used a series of quantitative indicators that allow us to asses more precisely the contribution and role of every species in the biocoenosis and in the realisation of the biomass production. In this way, by an abstract approach there are used practical applications and measurements that help to quantify the biodiversity relative values. These methods are useful for the setting of the measures for protection of the species or species communities. Many researchers have demonstrated the relationship between the fertility of the soil and the specific diversity of a vegetation community, respectively the changes at the level of fertility determinate changes in the biomass production and respectively on the species number from the affected community. The importance of the paper topic is given by the fact that in our country grasslands have the greatest species number from all the terrestrial ecosystems. Thus, grasslands represent an important source of feed for the cattle and a biodiversity reservoir. Their quality is very important, they being highly valuable from economic and ecologic point of view. The purpose of the work is to characterize grassland from the marginal area of Timişoara (Timiş County) to diagnose its condition. For the vegetation analysis there was realised the floristic inventory. The researches had in view the analysis of the following vegetation features: floristic composition and several ecological spectres (life-form, bio-geographical elements, temperature, and moisture and soil pH). The data have been collected from grassland from the margin of the town Timişoara along the road to the locality Becicherecul Mic, the data being collected during June 2018. The vegetation cover has mosaic like aspect formed from mesophyte and halophytic patches of vegetation. During the rainy years the halophytic vegetation is expressing less due the leaching of the salts.*

Keywords*: grassland, pasture, vegetation, life-form, bio-geographical elements, temperature, moisture and soil pH.*

INTRODUCTION

Grasslands are agroecosystems and their vegetation cover is influenced by the management. They have many definitions, but for the European grasslands PEETERS *et al.* (2014) defined the term more detailed and mentioned different classifications, there being framed the grasslands developed on saline soils approached in this work as being natural grasslands.

According with PĂCURAR *et al.* (2018) and SAMUIL *et al.* (2011, 2013), the floristic composition of the grassland is deeply influenced by the application of the maintenance works as fertilisation and mulching. Evolution of the floristic composition vas studied by researchers from Slovenia under the influence of fertilisation and cutting (VIDRIH *et al*., 2009).

Great changes in the floristic composition of the grassland were determined by the researches of ROTAR *et al.* (2015) too.

MATERIAL AND METHODS

The observation have been realised on a grassland surface placed at the exit of the town Timişoara to the locality Becicherecul Mic. The data have been collected during the

month June of the year 2018 with the help of the Monitoring Centre for Invasive Species from Banat`s University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara.

The analysed grassland plot was analysed using BRAUN-BLANQUET (1964) method of data collection. The general aspect of the vegetation is mosaic like with salty soil patches, the dominant vegetation being mesophyte. The halophyte vegetation is expressed less during the rainy years due to the leaching of the salts on the soil profile. For the analysis of the vegetation was done the floristic inventory of the pasture, necessary for the determining of the floristic composition as species number and as coverage rate (A%) of the species.

Thus, there were analysed several ecological aspects of the pasture sward, respectively the spectres for life-forms and bio-geographical elements and the ecological spectres for moisture (U), temperature (T) and soil reaction (R). For this purpose were used the Ellenberg indicator values adapted by SANDA *et al.* (1983) for the vegetation of the grasslands from Romania.

The purpose of the work is to analyse the condition of the grassland from the point of view of floristic composition and several ecological features.

RESULTS AND DISCUSSIONS

The vegetation cover has a mosaic like aspect of mesophyte vegetation with halophyte vegetation patches. In table 1 is presented a synthetic relevé of the studied pasture from an area with obvious salty soil vegetation.

Table 1

Synthetic relevé of the vegetation of the pasture from Timişoara (2018)

No.	Life-form	Bio-geographical element	Species	Moisture (U)	Temp. (T)	Soil reaction (R)	Coverage (A%)
GRASSES							
1	H	Eua	*Festuca pseudovina*	2	4	4	44,7
2	G (H)	Cosm	*Cynodon dactylon*	2	3,5	0	11,3
3	H	Eua (Med)	*Lolium perenne*	2,5	4	4,5	4,4
4	Th	Eua	*Setaria viridis*	2	4	0	1,3
5	H	Circ	*Puccinelia limosa*	4,5	3	4	0,2
6	G	Eua	*Agropyron repens*	0	0	0	10,3
7	G-H	Eua (cont)	*Poa bulbosa*	2	3,5	4	20,1
LEGUMES							
1	H (Ch)	Eur (Med)	*Ononis spinosa*	0	3,5	0	0,3
2	H	Eua (cont)	*Trifolium micranthum*	2,5	2	4	0,8
3	Th	Med	*Melilotus officinalis*	1,5	4,5	5	0,2
4	H	Eua (Med)	*Lotus tenuis*	3,5	3	4	0,2
RUSHES AND SEDGES							
1	HH	Cosm	*Juncus gerardi*	6	0	4,5	0,2
FOORBS							
1	H (Th)	Pont-Med	*Scorzonera cana*	2	4	4,5	0,1
2	H	Eua (cont)	*Ranunculus sceleratus*	2	4	5	0,1
3	H -TH	Eua	*Cichorium intybus*	2,5	3,5	4,5	0,2
4	H	Eua (cont)	*Achillea setacea*	2	3	5	2,2
5	G	Eua (Med)	*Cirsium arvense*	0	0	0	0,5
6	H	Pont	*Gallium verum*	1	5	4	0,5
7	H	Eua (Med)	*Taraxacum officinale*	3	0	0	0,1
8	Th	Pont-Pan	*Artemisia maritima*	2	4	5	0,1
9	H	Eua (Med)	*Aster tripolium*	5	0	5	0,3
10	HH	Cosm	*Matricaria chamomilla*	3	4	0	0,1
11	H	Pan-Dac	*Plantago schvarzenbergiana*	3,5	4	5	0,2
12	Th	Eua	*Poligonum persicaria*	2	3,5	4,5	1,5
13	Th-H	Eua-Med	*Daucus carota*	2,5	3	0	0,1

The year of the researches was rainy in the first half, the coverage with vegetation os the soil being 100%, there being not present patches without vegetation specific for the salty soils at the moment of data collection.

In the vegetation cover were dominant the grasses species, the greatest coverage rate having the species *Festuca pseudovina* (A% = 44.7%), this being followed by other three grass species, respectively *Poa bulbosa* (A% = 20.1%), *Cynodon dactylon* (A% = 11.3%) and *Agropyron repens* (A% = 10.3%).

The most numerous species in the vegetation sward were forbs with 13 species, these being followed by grasses with seven species. Leguminous were represented by four species and rushes with one species (figure 1).

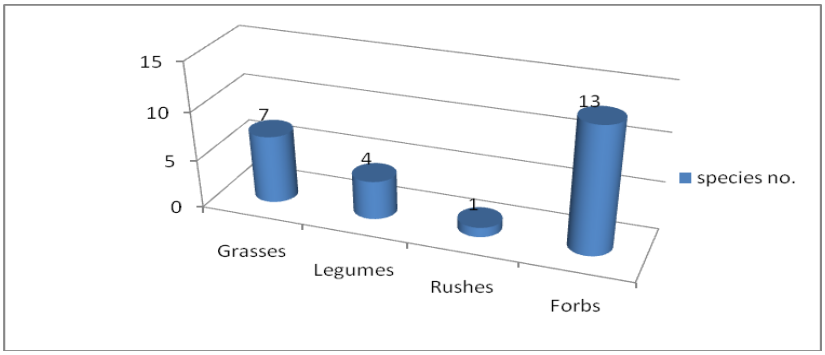

Figure 1 Floristic composition of the pasture as species numbers on functional groups

In figure 2 is presented the floristic composition considering the coverage rates of the main functional groups of plants in grassland. Thus, there can be noticed that there are dominant the grasses with a coverage rate (A%) of 92.3%. Forbs have a coverage of 6% followed by legumes with 1.5%. the lowest coverage rate have rushes represented by the species *Juncus gerardi* with A% = 0.2%.

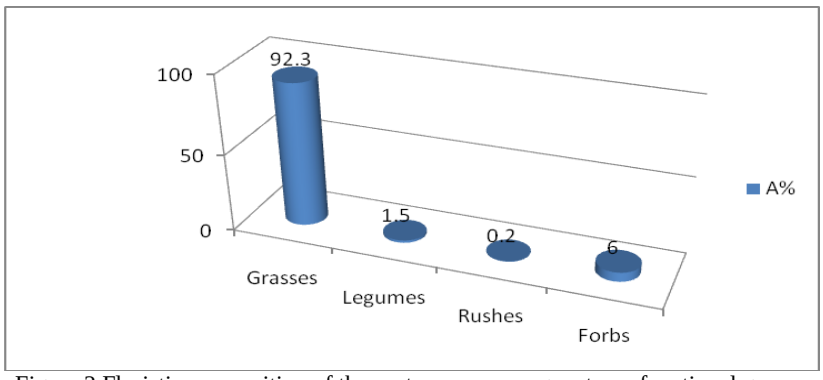

Figure 2 Floristic composition of the pasture as coverage rate on functional groups

After the analysis of the floristic composition there have been analysed Ellenberg indicator values for moisture (U), temperature (T) and soil reaction (R), using the values adapted for the vegetation from Romania by SANDA *et al.* (1983).

In figure 3 is presented the spectre for humidity of the sward. Thus, the influence of the local soil and climate conditions is reflecting on the structure of the vegetation cover. There are represented in the highest rate the xerophytes (U2 = 39.8%) followed by the ones indifferent for moisture, respectively U0 = 32%. An important rate in the pasture have the mezo-xerophytes (U2.5 = 16%).

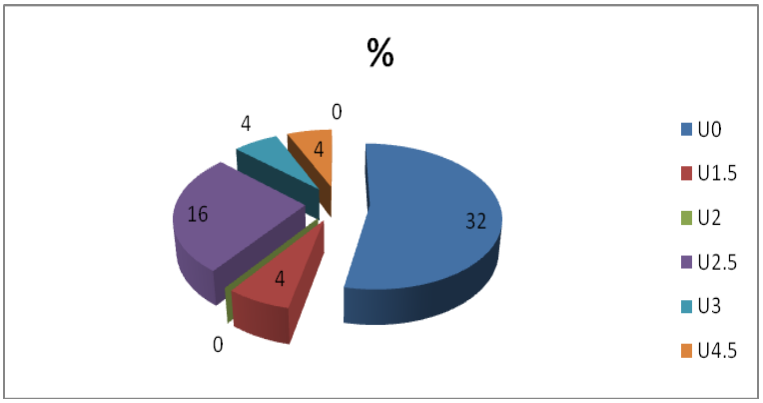

Figure 3 Ecological spectre for moisture (U)

Other ecological factor that influences the floristic composition of the pasture is the temperature, this determining the presence or absence of some species from the vegetation sward. In figure 4 is presented the ecological spectre for the temperature indicator values from the analysed grassland where were collected the data. The diagram shows that the most of the species from the vegetation cover of the grassland are mesothermal; respectively have moderate demands for temperature (T3.5 = 36%), being followed by the species indifferent to temperature (T0 = 28%) and the species with temperature moderate to high demands (T4 =24%).

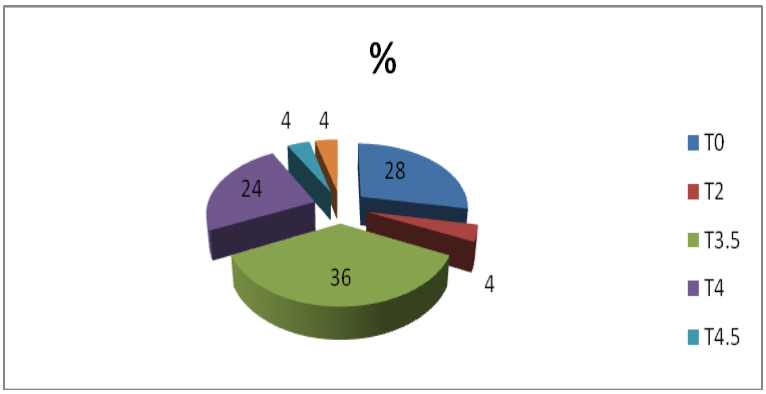

Figure 4 Ecological spectre for temperature (T)

Soil reaction is also a determining factor for the vegetation structure of grassland, this being analysed in figure 5. The obtained results show the highest rate of the species from the sward are indifferent to the soil pH (R0 = 35%). A similar rate have the neutral-basic soil

species (R4 =24%), strong basic soil species (R5 = 21%) and moderate basic soil species (R4.5 = 20%).

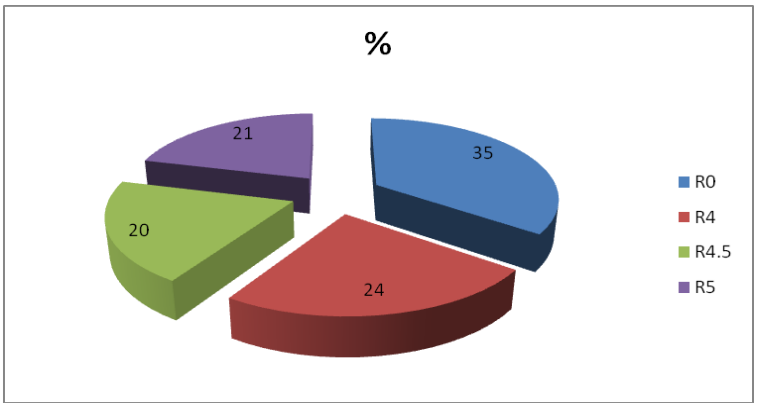

Figure. 5 Ecological spectre for soil reaction (R)

Grassland vegetation was analysed also considering the life-forms structure of the sward (figure 6). As is shown in the diagram, the greatest coverage rate have the hemicryptophytes (H = 53.7%) followed by the geophytes-hemicryptophytes (G-H = 20.1%; G(H) = 11.3%) and geophytes (G = 10.8%). This aspect show the grassland vegetation has balanced aspects because the greatest part of the plant species hemicryptophytes.

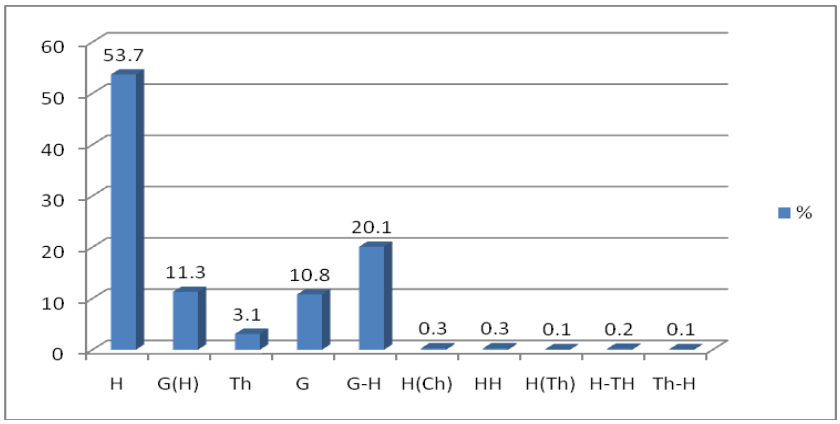

Figure 6 Life-form structure of the species

Thus, the paper had in view the analysis of the vegetation structure as bio-graphical elements. In figure 7 is presented the spectre of bio-geographical elements of the vegetation cover from the analysed pasture. According with the obtained results, the greatest coverage rate have the Eurasian species (Eua = 58%), followed by Eurasian – continental (Eua(cont) = 23.2%). In lower rates are found the Cosmopolite species (Cosm = 11.6%) and the Eurasian – Mediterranean (Eua-Med = 5.6%).

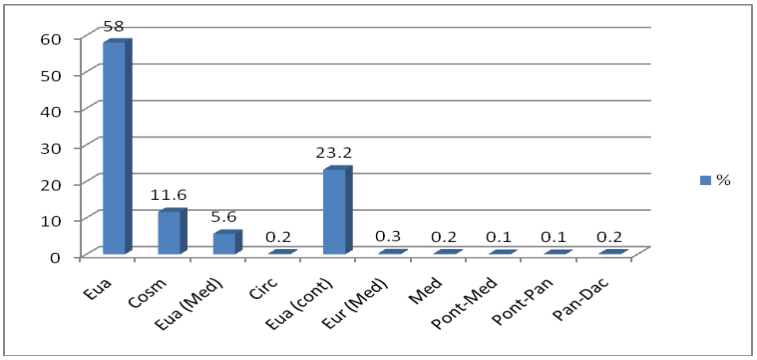

Figure 7 Bio-geographical elements of the species

CONCLUSIONS

Synthesising the obtained results there have been concluded the following:

- The most numerous are the forbs, but considering the coverage rates grasses are dominant;
- Legumes have a low participation;
- Regarding the structure of the pasture considering the demands for moisture the vegetation is dominated by the species with low needs for moisture followed by the species indifferent for moisture;
- The indicator values for temperature show that the analysed sward is dominated by the species with moderate demands for temperature followed by the indifferent species;
- The vegetation from the studied pasture is dominated by species indifferent to the soil reaction;
- The structure of the vegetation considering the life-forms is dominated by the hemicryptophytes;
- Considering the bio-geographical elements dominate the Eurasian species.

BIBLIOGRAPHY

ARGENTI G., LOMBARDI G. AND SARATEANU VERONICA (2011) L'Approccio Tipologico per la Pianificazione Pastorale in Ambiente Montano, Atti del XXXX Convegno della Società Italiana di Agronomia, Teramo, 7-9 settembre 2011, p. 334-335

BĂRBOS M. I., TÂRZIU D.R. (2009) - Recomandări de monitorizare pentru habitatul 6230* Pajişti de Nardus stricta bogate în specii pe substraturi silicioase, PROIECT LIFE05 NAT/RO/000176: „Habitate prioritare alpine, subalpine şi forestiere din România!", Braşov, http://www.lifenatura2000.ro/doc/Raport%20monitorizare%206230%20final.pdf.

BRAUN-BLANQUET, J., 1964, Pflanzensoziologie, Grundzüge der Vegetationskunde. 3rd Edition, Springer-Verlag, Berlin, pp. 631.

CRISTEA V. (2004) – Fitosociologie, Editura Presa Universitară Clujeană, Cluj Napoca.

KOVACS A. (1979) – Indicatorii biologici, ecologici şi economici ai florei pajiştilor. Redacţia de propagandă tehnică agricolă, Bucureşti, 50 p.

LE FLOC'H E. (Ed.) (2007) - Methodological guide for the study and monitoring of flora and vegetation, ROSELT/OSS Collection - Technical Contribution Number 1, Tunis, 155 p.

PĂCURAR F., BALÁZSI ÁGNES, ROTAR I., VAIDA IOANA, REIF A., VIDICAN ROXANA, RUŞDEA EVELYN, STOIAN V., SÂNGEORZAN D., 2018, Technologies used for maintaining oligotrophic

grasslands and their biodiversity in a mountain landscape, Romanian Biotechnological Letters, Vol. 23 (10): on https://www.rombio.eu/docs/Pacurar%20et%20al.pdf.

PĂTRUȚ D. (2003) - Cercetări asupra biodiversităţii vegetaţiei halofile din Câmpia Banatului, Teză de doctorat USAMVB Timişoara.

PEETERS A., BEAUFOY G., CANALS R.M., DE VLIEGHER A., HUYGHE C., ISSELSTEIN J., JONES G., KESSLER W., KIRILOV A., MOSQUERA-LOSADA M.R., NILSDOTTER-LINDE N., PARENTE G., PEYRAUD J.- L., PICKERT J., PLANTUREUX S., PORQUEDDU C., RATAJ D., STYPINSKI P., TONN B., VAN DEN POL – VAN DASSELAAR A., VINTU V., WILKINS R.J., 2014, Grassland term definitions and classifications adapted to the diversity of European grassland-based systems, Grassland Science in Europe, Vol. 19 - EGF at 50: the Future of European Grasslands, pp 743-750.

PEETERS A., JANSSEN F. (1998) – Species rich grassland: diagnostic, restoration, and use in intensive livestock production system, Proceeding of the European Grassland Federation Symposium, Ungaria, p. 375 – 393

ROTAR I., PĂCURAR F., VIDICAN R., MĂLINAȘ A., GLIGA A., 2015, Mineral fertilization on mountain grassland, Grassland Science in Europe, Vol. 20 – Grassland and forages in high output dairy farming systems, pp. 301-303.

SAMUIL C., VINTU V., SIRBU C. , SAGHIN G., MUNTIANU I., CIOBANU C., 2011, Low input management of *Agrostis capillaris+Festuca rubra* grasslands in Romania, Proceedings of the 16th Symposium of the European Grassland FederationAt: Gumpenstein, Austria, Volume: 16.

SAMUIL C., VINTU, SIRBU C., STAVARACHE M., 2013, Influence of Fertilizers on the Biodiversity of Semi-natural Grassland in the Eastern Carpathians, Notulae Botanicae Horti Agrobotanici. Cluj-Napoca, ISSN 0255-965X, No 41 (1): 195-200.

SANDA V., POPESCU A., DOLTU M., DONIȚĂ N., 1983, Caracterizarea ecologică şi fitocenologică a speciilor spontane din flora României, Muz. Brukenthal, Studii şi comunicori, Ştiinţe naturale, Sibiu, Supliment, 25, 1-126.

VIDRIH M., ČOP J., TRDAN S., ELER K., 2009, Changes in floristic composition over three years of Ljubljana marsh grassland in relation to cutting and fertilising management, Acta Agriculturae Slovenica, 93 - 2, July 2009, 193 – 199.

*** Flora RPR – RSR 1952 – 1966