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STUDY REGARDING SPECIFIC FRECVENCY AND PASTORAL VALUE OF *POA PRATENSIS L.* GRASSLAND IN SURDUCULUI HILLS AREA (WESTERN ROMANIA)

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Abstract: *Dynamics of vegetation is more and more affected by human activities. The more human society changes or the more and more systems are being built, the more important it is to understand how human activities affect succession. Human dominance of the systems covers a great variety of the management or control. The evolution and succession of the vegetation is developing permanently as a result of the development law and human impact, the development of the vegetation cover being analysed by the scientists from different countries. Through this work we are trying to do an appreciation on the effect of restriction of mowing and grazing on a permanent grassland of Poa pratensis L. The study was developed in the Surducului Hills that are placed at the base of the Poiana Rusca Mountains, at the east of the Bega river terraces. The observations were done on permanent grassland during five years (2006-2009). The vegetation was determined using the linear point-quadrate method, the results being calculated on the base of the botanical surveys. The geographical coordinates were determined with the help of a GPS receptor Magellan. The statistical method used was the correlation analysis. In conclusion we can say that the dynamics of the vegetation is in an intermediate evolution state created by the disturbances connected with the mowing and grazing; the underexploitation and the microclimate created by the presence of the Surduc Lake has determined the trend of the species from the point of view of the FS%; there is a negative correlation between VP and FS% of the legumes and between VP and FS% of the species belonging to other botanical families isn't any correlation. Thus, our purpose is to continue this study for the applying and implementing of some restoration measures for the increase of the quantity and quality of the yield obtained on the surface of these permanent grasslands.*

Key words: *grasslands, pastoral value, specific volume*

INTRODUCTION

The effects of agricultural practices on the floristic composition and on plant features of the grasslands are well known. Plant features are characteristics measurable at individual level, from the cell to the entire plant, with no reference to environmental conditions or to another level of organisation (VIOLLE *et al* .2007, cited by AMIAUD *et al* 2008).

At present, in some regions including mountain areas, the pastures were abandoned almost entirely. This can be illustrated also by the dramatic drop of the number of herbivores (PEETERS 2008). In the last years the number of research regarding the impact of management on structure and composition of the flora of pastures has grown considerably (KRAHULEC et al., 2001; MARRIOTT et al., 2002; MATEJKOVÁ et al., 2003; PAVLU et al., 2003; HOFMANN and ISSELSTEIN, 2004; KOHLER et al., 2004 quoted by PAVLU et al. 2006).

Mowing, livestock density, mineral or organic fertilization but also animal species and time of exploitation are the main management variables that drive the vegetation dynamics of a pasture. The intensity of time changes of these processes result in the classification, composition of the flora and implicitly in changes in the ecosystem's functionality.

These explanations and the great interest for the monitoring of the impact of mowing and grazing on plant communities have the purpose of keeping up biodiversity, economical and esthetical values (JITKA KLIMENŠOVă et al. 2008).

MATERIAL AND METHODS

Studies were carried out in the Surduc Hills area that borders the Poiana Ruscă Mountain at north-west, with maximum development in the west, between the Timiş-Bega Valleys and in the neighbourhood of the Surduc Lake. The border of the hills with the mountain follows the route Crivina, Hăuzeşti, Glatna Română, Zolt, Tomeşti, and then along the Saşa River Valley up to Crivina de Sus. At the contact point with the mountain, along the Glatna River, there are a series of depressions and tectonic and erosion basins among which the Gladnelor Depression. Another unit contrasting with the surrounding relief is the Fârdea Depression, along the Gladna River Valley and in the confluence area of the Gladna River with the rivulets Hăuzeasca and Munişel. In the middle of the hilly area and at the foot of the mountain lies the Fârdea Depression, an even surface in central and western areas, the passage from the hills to the depression being obvious in the eastern area, under the from of low hills.

Observations of the grassy cover and of the grassland management (mowing, grazing) were made between 2006 and 2010, on grassland dominated initially by the species *Poa pratensis* L. In this case, the grassland has the following coordinates: longitude 45°50′39″N, latitude 22°11′49″E at an altitude of 215 m with southern-western exposition, in the near vicinity of the locality Fârdea and about 4km from the Surduc Lake.

Vegetation was determined through the double meter (linear) method (DAGET & POISSONET 1971), with observations on five permanent samples (5×5m). We could thus determine the mean of the specific frequency (*SF* %) and of pastoral value (*VP*). The statistical method we used was the analysis of correlations.

RESULTS AND DISCUSSIONS

These last years, the number of researches concerning the assessment of the effect of management on the structure and floristic composition of grassland increased considerably (KRAHULEC *et al*. 2001; MARRIOTT *et al*. 2002; MATEJJKOVA *et al*. 2003; PAVLU *et al*. 2003; HOFMANN & ISSELSTEIN 2004; KOHLER *et al.* 2004 cited by PAVLU *et al*. 2006).

FACELLI & PICKETT (1990) claimed that the trajectories of the dynamics of vegetation can be different and that they depend on a certain number of factors such as the initial composition of the vegetation. In this respect, they made an assessment of the floristic composition at the beginning of their study and they also monitored the way the two permanent grasslands they studied were exploited.

Thus, in 2006, when we first sampled the vegetation, we identified on the *Poa pratensis L.* grassland 31 species. Grouping the species per botanical families and expressing them in percentage points, we found out that *Asteraceae* (*Crepis bienis* L., *Cichorium inthybus* L, *Taraxacum officinale Weber* L., etc.) and *Poaceae* (*Festuca pratensis* L., *Bromus erectus* Huds., *Poa pratensis* L., *Agrostis capillaris* L., *Holcus lannatus* L., etc.) reached the highest percentage (22 .5%), with 7 species per family, followed by *Fabaceae* (19.5%) with 6 species. (Figure 1).

Polygonaceae represented by the species *Polygonum aviculare* L. and *Rumex acetosa* L. share 6.23%. (Figure 1) All the other botanical families are represented by one or two species reaching 3.25 % each. (Figure 1)

As for the way this grassland was exploited during the five years analysed, we could see the following: in 2006 and 2007, respectively, the grassland was mowed twice and grazed occasionally once a year and in 2008 it was mowed once and occasionally grazed.

The years 2009 and 2010 were characterised from the point of view of exploitation by abandon since the owner no longer allowed the access of the cattle on the land and he also restricted mowing.

Differences concerning specific frequency (%) of species between 2006 and 2009 are not quite obvious. The largest differences were in the years 2009 and 2010, when under-exploitation had a negative impact on the species of *Poaceae* whose specific frequency (%) increased from 27.1% to 43.3%. (Figure 2) All dominant species making up the vegetation cover and belonging to the *Poaceae* had not the same ascending trend from the point of view of their specific frequency (%) (Figure 2).

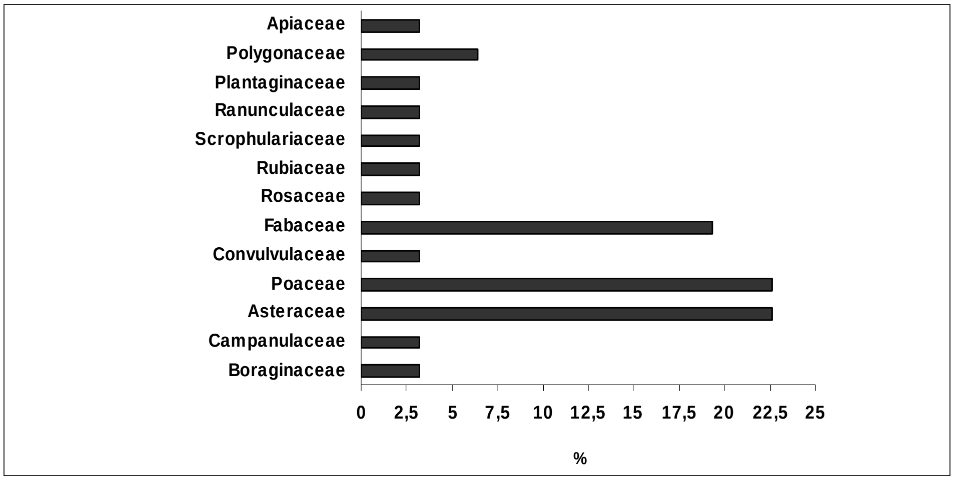

Figure 1. Structure per botanical families of the species on the *Poa pratensis L.* grassland

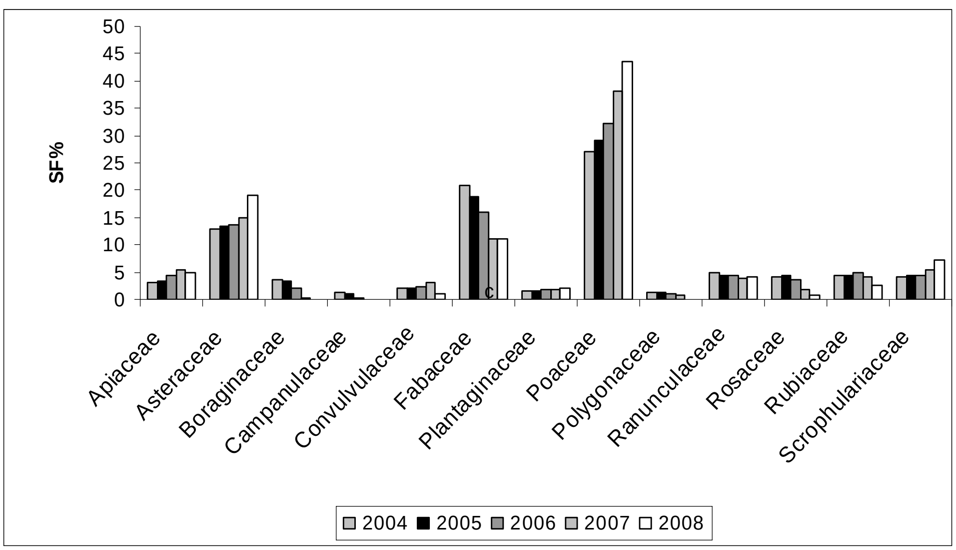

Figure 2. Dynamics of species specific frequency (%) on the vegetation cover of the *Poa pratensis* L. grassland

As POPESCU (2001) concluded in his study of the permanent grasslands in northern Oltenia (southern Romania), phyto-coenoses built up by *Poa pratensis* L. can evolve towards mesophilous hill associations built up by *Agrostis capillaris* and other mesophilous species. Through ruderalisation, this association can turn into *Lolio-Plantaginetum majoris*, an association of well set lands with many ruderal species or towards *Cynodontetum dactyloni*.

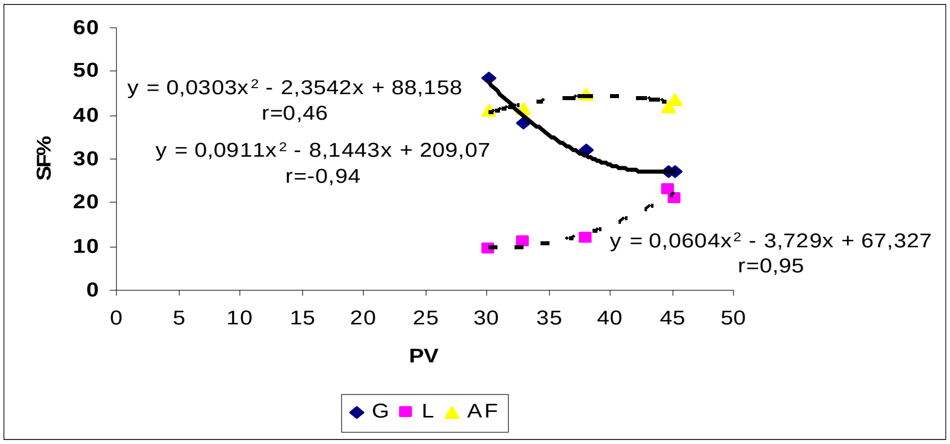

Figure 3. Correlation between pastoral value (PV) and specific frequency (SF) of the species of graminaceae, legumes, and other botanical families of the *Poa pratensis* L. grassland

This is not the case of our grassland, since in our case the species that increased its specific frequency (%) considerably was *Holcus lannatus* L. detrimental to the species *Lolium perenne* L., which also had an influence on the pastoral value which decreased from 45.3 to 30.2. *Holcus lannatus* L. seldom makes up fallows on abandoned agricultural lands, as stages of evolution towards the reinstauration of potential vegetation in the area. The fallowing degree, the frequency and abundance of segetal and ruderal species, together with species characteristic to grasslands show different stages of the vegetal succession and determines the heterogeneous character of the phytocoenoses (GRIGORIU 2003).

Among *Asteraceae*, *Crepis bienis* L. showed an ascending dynamics of the specific frequency (%) thus pointing out the trend towards ruderalisation. Analysing the specific frequency (%) of the legumes, we could see that it decreased from 21.0% la 11.2%, while the species *Vicia cracca* L. disappeared from the spots we analysed.

Under-exploitation results in a significant increase of the amount of biomass and of the dominance of certain species (NAVH & WITTAKER 1979; FERNANDES ALES *et al*. 1989, cited by Faur F. 2006), together with changes of the micro-environment conditions resulting in a slowing down of the growth and regeneration of other species doubled by the trend towards local domination of a single species, which reduces local bio-diversity (MILES 1979; WILIAMS 1983; BOBBINK & WILLEMS 1987; BERNALDES 1991, cited by FAUR F. 2006).

Thus we can also explain the dynamics of species belonging to the families *Boraginaceae* and *Campanulaceae* whose specific frequency (%) was 0 in 2008 maybe because being inhibited. (Figure 2)

Analysing the correlation between pastoral value (PV) and specific frequency (%) of graminaceae (G), legumes (L), and of the species belonging to other botanical families (OF), we could see there is a negative correlation (r =- 0.95) between the pastoral value and the specific frequency (%) in graminaceae and a positive one in legumes (r =0.95). Between the pastoral value and the specific frequency (%) of the plants of other botanical families there is no correlation (r=0.46). (Figure 3)

The explanation for which the trend of the species from the point of view of their specific frequency (%) was probably determined by both under-exploitation and the microclimate developed by the presence of the Surduc Lake.

CONCLUSIONS

- The dynamics of vegetation is in an intermediary stage of evolution determined by the disturbances related to mowing and grazing;
- Under-exploitation as well as the micro-climate developed by the presence of the Surduc Lake determined the trend of the species from the point of view of their specific frequency (%);
- There is a negative correlation between pastoral value and specific frequency (%) in graminaceae, a positive correlation between pastoral value and specific frequency (%) in legumes, and no correlation between the same values in the species belonging to other botanical families.

BIBLIOGRPHY

1. AMIAUD B.,MERLIN A., DAMOUR A., GAUJOUR E., PLANTUREUX S. (2008) Efects of agricultural practices on spatial dispersal patterns of permanent grassland species, *Grassland sience in Europe* (13) pp.75
2. DAGET PH, POISSONET J. (1971) Une méthode d'analyse phytologique des prairtes, Annales Agronom.,22(1) pp.5-41
3. GRIGORIU ALMA 2003,.Studiu ecologic şi fitocenologic al vegetației de pajişti din bazinul superior şi mijlociu al râului Timiş. Teză de doctorat p.159
4. FACELLI, J.M., PICKETT S.T.A., 1990. *Markovian chains and the role of history in succession.* Trends in Ecology and Evolution 5: pg. 27-30
5. FAUR F. 2006 . Efectele subexploatării pe pajişti permanente de la Poiane Braşov .Teză de doctorat
6. PAVLŮ V. ,ET.AL. (2006) Changes in plant densities in a mesic species-rich grassland after imposing different grazing management treatments, *Grass and Forage Science* 61(1), pp 42-51
7. PEETERS A., 2008 Challenges for grasslands, grasslands-based szstems and their production potential in Europe. *Grassland science in Europe* 13, p.11
8. POPESCU GH., 2001. Pajştile din nordul Oltenei, Editura Universitatea Craiova ISBN 973-8043-74-8, pp.157-15