APPROACH ON THE EVOLUTION OF GRASSLANDS FLORISTIC COMPOSITION AFTER FLOODING

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Abstract: *The purpose of this research is to highlight the evolution of grassland vegetation after flooding, because the scientific data in this topic are limited for western Romania. The studied material consists in six grassland that were flooded in the spring of 2005, respectively 3 surfaces from Grăniceri and other 3 from Foieni, both localities belonging to Timiş County. The data were registered during 2005 – 2007. The study method used for vegetation analysis was quadrate point method. The results obtained on grassland Grăniceri no. 1 show the dominant species are mainly annual grasses as Hordeum histrix and Bromus hordeaceus, and in the next years they were replaced with perennial grasses with high forager value as Lolium perenne and Dactylis glomerata. The persistence of humidity excess favours the maintenance of the species adapted for humidity excess as are rushes and sedges. In the case of Grăniceri no. 2 the situation regarding the dominant grasses is similar with the one found in grassland Grăniceri nr. 1, but there an important contribution has Xanthium strumarium, and in the next years Lolium perenne became dominant. Grassland Grăniceri no. 3 presents the same situation of grasses, but there are present halophyte species as Limonium gmelini. On those three grassland studied in Foieni grasses had an increase trend from the point of view of their contribution in vegetation cover. Species from other botanical families have a lower participation. The dominant grasses found there are Cynodon dactylon and Echinochloa crus-galli. There are present rushes and sedges too and legumes are missing in general or participate in the vegetation cover with 0.2% and 0.8%. These grasslands are overexploited because they are placed near to the inhabited area of the village.*

Key words**:** *grassland, floristic composition, flooding*

INTRODUCTION

INSAUSTI *et al*. (1999) says that prolonged flooding is a natural disturbance element for some grassland surfaces. Overgrazing influences the structure of the vegetation carpet of these surfaces. The excessive grazing of this grassland type determinates the decrease of the grasses biomass and increase of the species from other botanical families in most of the cases. In this way, grasslands affected by flooding prolonged as duration can recover their botanical composition, mainly through the increase of the percentage of grasses and the reduction of the percentage of other botanical families. Thus, the periodical flooding of the grassland can have a positive effect on the grassland ecosystem.

STRIKER *et al.* (2007) has noticed that flooded grasslands will favour the species resistant to longer or shorter time duration flooding, determining the elimination of some concurrent species for the plants valuable from forager point of view. This recovery takes place in short time after the production of the flooding phenomenon.

In conformity with CHANETON *et al*. (1988), referring to flooded grasslands from Argentinean pampas says that flooding leads to the improvement of forage source of the grassland, one of the major changes in the floristic composition being the increase of the cover percentage of the native graminoids and the decrease of the alien forbs.

Results obtained by GERARD *et al.* (2008) showed that flooding does contribute to the density and composition of the seed bank; most imported seeds belong to only a few species. Therefore, it is unlikely that flooding substantially enhances the potential species richness. Accordingly with their findings it is unclear which factors impede the establishment of imported species in the vegetation.

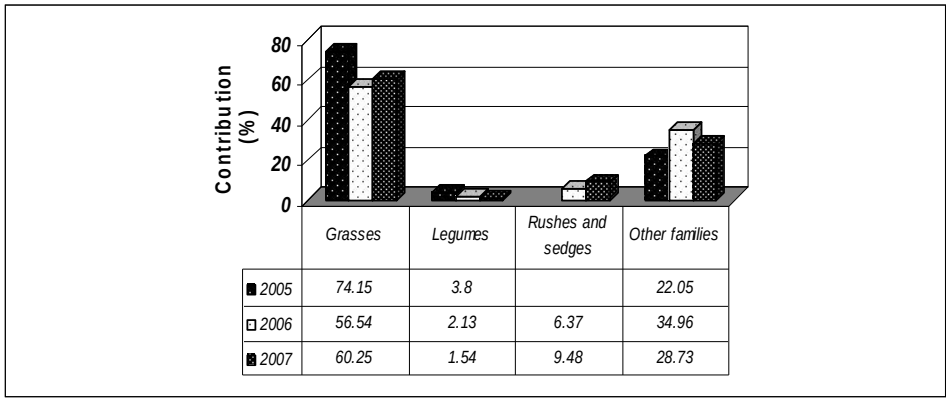
The purpose of this research is to highlight the evolution of grassland vegetation after flooding from the point of view of the contribution of the main economic plant groups, because the scientific data in this topic are limited for western Romania.

MATERIAL AND METHODS

Studied material consists in the vegetation of six grassland that were flooded in the spring of 2005, respectively three surfaces from Grăniceri and other three from Foieni, both localities belonging to Timiş county. The data were registered during 2005-2007. The vegetation was surveyed using the quadrate point method (DAGET *et* POISSONET, 1971), the collected data being used for the calculation of the specific contribution and then to the summing of the contribution on the main economic plant groups (grasses, legumes, rushes and sedges, species from other botanical families).

RESULTS AND DISCUSSIONS

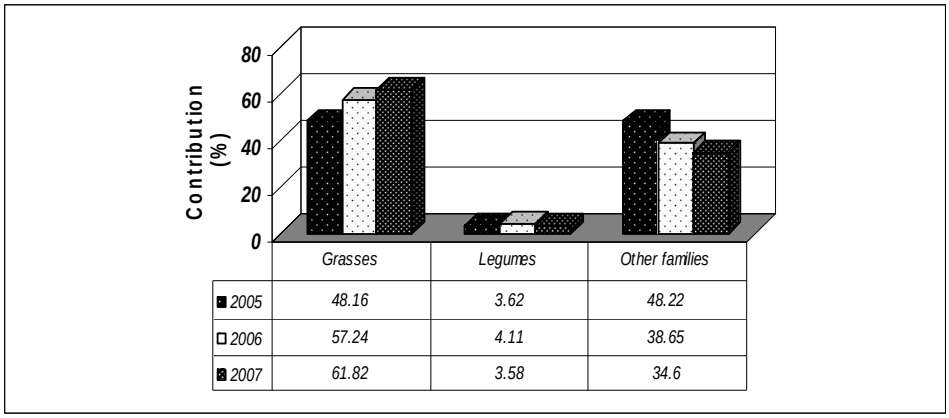
Grassland Grăniceri no. 1 was flooded for about a week. The vegetation is dominated in 2005 by species as *Lolium perenne, Hordeum histrix* and *Achillea millefolium*, in 2006 by *Lolium perenne, Bromus hordeaceus, Poa annua, Dactylis glomerata* and *Achillea millefolium*, and in 2007 by *Lolium perenne, Bromus hordeaceus, Poa annua, Festuca valesiaca* and *Achillea millefolium*. Vegetation has coverage of 100% on the soil surface during the studied period. The vegetation cover of this grassland is formed from 17 species in 2005, 16 species in 2006 and 22 in 2007. In figure 1 is represented the contribution of the main economic groups of plants from Grăniceri no. 1 grassland. As is shown in the graph mentioned above, in 2005 the greatest contribution has grasses (74.15%), being followed by the species from other families. Legumes are contributing in a reduced measure to the vegetation cover because the soil air capacity hasn't been affected for long time. Also, there appears *Carex praecox* that shows the presence of the temporary water excess. In 2006 and 2007 grasses still have an important contribution (56.54%), but in the vegetation cover participates in an important measure the species from other botanical families (34.96%).



	Grasses	Legumes	Rushes and sedges	Other families
2005	74.15	3.8		22.05
2006	56.54	2.13	6.37	34.96
2007	60.25	1.54	9.48	28.73

Figure: 1. Contribution of the main technological plants groups in grassland Grăniceri no.1

Grassland Grăniceri no. 2 was covered with water for about two weeks. The vegetation is dominated in 2005 by species as *Medicago lupulina, Lolium perenne, Bromus hordeaceus* and *Achillea setacea*, in 2006 by *Agropyron repens, Bromus hordeaceus* and *Poa pratensis*, and in 2007 by *Agropyron repens, Lolium perenne* and *Poa pratensis*. Vegetation has in 2005 coverage of 80% on the soil surface, and in the next two years reaches coverage of 100%. The vegetation cover of this grassland is formed in 2005 by 17 species, in 2006 by 24 species and in 2007 by 27 species. In figure 2 is represented the contribution of the main economic groups of plants from Grăniceri no. 2 grassland. Analysing the graph there is noticed that in 2005 the greatest contribution have species from other botanical families (48.22%), being followed in a similar amount by grasses (48.16%), legumes contributes in a reduced measure to the formation of this vegetation cover (3.62%). In 2006 grasses have increased as contribution and represent more then a half of the aerial biomass (57.24%), but in the vegetation cover are present in a great percentage species from other botanical families (38.65%), and legumes have a contribution of 4.11%. in 2007 grasses contribution is greatest then in the previous year reaching to 61.82%, and the contribution of the species from other botanical families decreases to 34.6%, and legumes are maintaining at close values (3.58%).



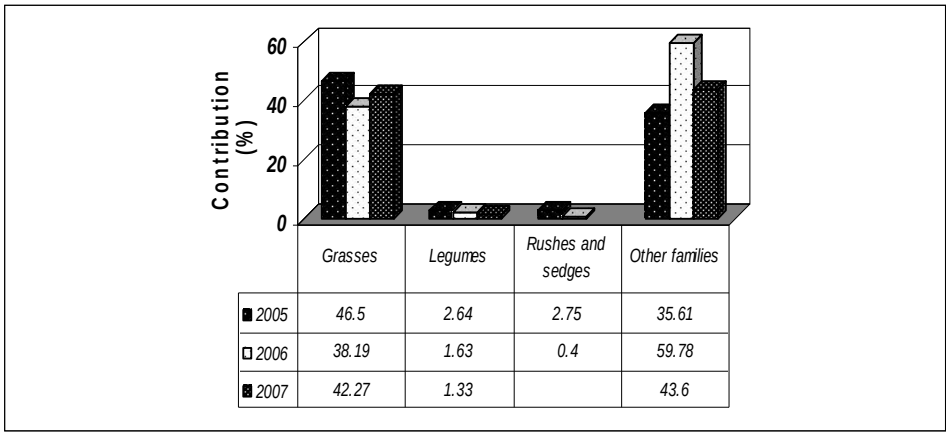
	Grasses	Legumes	Other families
2005	48.16	3.62	48.22
2006	57.24	4.11	38.65
2007	61.82	3.58	34.6

Figure: 2. Contribution of the main technological plants groups in grassland Grăniceri no.2

Grassland Grăniceri no.3 has been flooded for about two weeks. The vegetation was dominated in 2005 by *Alopecurus pratensis*, in 2006 by *Alopecurus pratensis, Festuca pseudovina* and *Agropyron repens*, and in 2007 by *Alopecurus pratensis, Agropyron repens* and *Festuca arundinacea*. In 2005 the vegetation has coverage of 70%, and in the next two years it reaches to 100%. The species number in 8 in 2005, 12 in 2006 and 14 in 2007. In figure 3 is represented the contribution of the main economic groups of plants from grassland Grăniceri no. 3. In 2005 grasses have a contribution of 46.5%, being followed by the species from other botanical families with 35.61%, and legumes contribute with 2.64% nearby rushes and sedges (2.75%). After the water disappearance from the soil surface there have remained salts at the soil surface that determinates the presence of the halophylic species as *Limonium gmelini*. In 2006 species from other families have increased their contribution and represents more then a half of the vegetation cover (59.78%), and grasses have decreased in comparison with the previous year (38.19%), and also has decreased the contribution of legumes and rushes and sedges. In 2007 has increased the grasses contribution in comparison with the previous year to 42.27%, and the species from other botanical families reach at 43.6%, legumes are

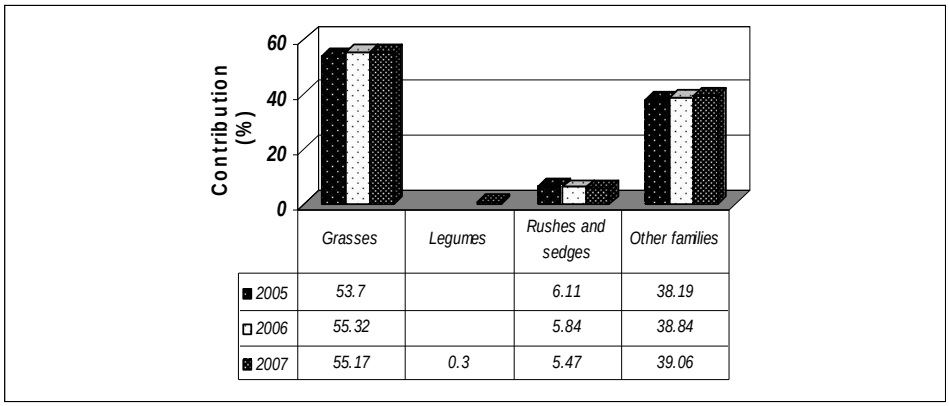
maintaining in a low percentage and the rushes and sedges disappear because of the opened channels executed in field that determinates the decrease of the phreatic water level.

Grassland Foieni no. 1 was covered with water for about two months. The vegetation is dominated in 2005 by *Cynodon dactylon*, in 2006 by *Cynodon dactylon, Lolium perenne* and *Portulaca oleracea*, and in 2007 by *Cynodon dactylon, Alopecurus pratensis* and *Festuca arundinacea*. Vegetation has in 2005 coverage of 10% on the soil surface and in the next years reaches to 100%. Vegetation cover is formed in 2005 from 4 species, in 2006 from 14 species and in 2007 from 22 species. In figure 4 is represented the contribution of the main economic groups of plants that are forming vegetation from grassland Foieni no. 1. Thus, in 2005 the greatest contribution have grasses (53.7%), these being followed by other families with 38.19%, legumes are absent and rushes and sedges have a contribution of 6.11%. in 2006 grasses are maintaining at similar values as in the previous year 55.32%, the same is in the case of other families (38.84%), legumes are still absent and rushes and sedges have a contribution of 5.84%. In 2007 the grasses contribution is maintaining close to the values registered in previous years (55.17%), the other families (39.06%) and rushes and sedges (5.47%) have the same trend, and appear the legumes (0.3%).



	Grasses	Legumes	Rushes and sedges	Other families
2005	46.5	2.64	2.75	35.61
2006	38.19	1.63	0.4	59.78
2007	42.27	1.33		43.6

Figure: 3. Contribution of the main technological plants groups in grassland Grăniceri no.3



	Grasses	Legumes	Rushes and sedges	Other families
2005	53.7		6.11	38.19
2006	55.32		5.84	38.84
2007	55.17	0.3	5.47	39.06

Figure: 4. Contribution of the main technological plants groups in grassland Foieni no.1

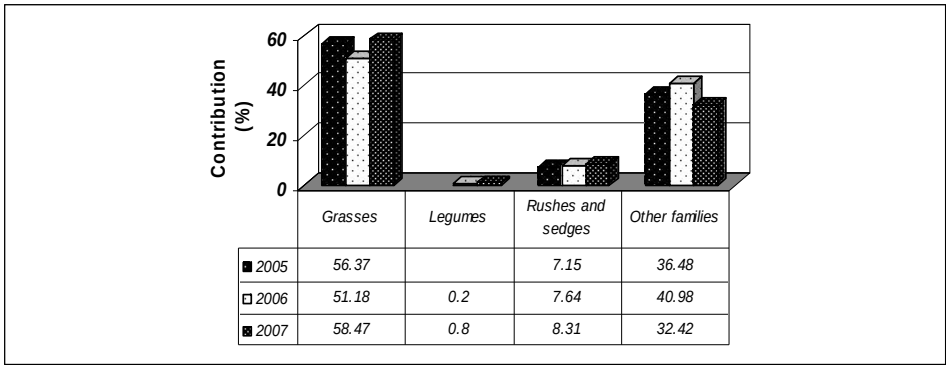


Figure: 5. Contribution of the main technological plants groups in grassland Foieni no.2

Grassland Foieni no. 2 was flooded for about a month. The vegetation is dominated in 2005 by *Cynodon dactylon*, in 2006 by *Cynodon dactylon* and *Alopecurus pratensis*, and in 2007 by *Cynodon dactylon, Alopecurus pratensis, Juncus tenuis* and *Convolvulus arvensis*. In 2005 vegetation has coverage of 40% and in the next two years reaches to 100%. The vegetation is formed in 2005 by 5 species, in 2006 by 11, and in 2007 by 13. In figure 5 is represented the contribution of the main economic groups of plants that are forming grassland Foieni no. 2. In 2005 grasses have the greatest contribution with 56.37%, being followed by other botanical families with 36.48%, legumes are absent and rushes and sedges participate with 7.15%. In 2006 grasses have a contribution similar with the previous year (51.18%) as the other families too (40.98%) and rushes and sedges (7.64%), and there appear legumes with 0.2%. In 2007 the contribution of grasses increase in comparison with the values registered in the previous years (58.47%, other families decrease as contribution to 32.42%, legumes contributes with 0.8%, and rushes and sedges have a contribution close to the previous year (8.31%).

Grassland Foieni no. 3 was flooded for about two months, this fact leading to the change of the initial vegetation. This was dominated in 2005 by *Echinochloa crus-galli, Xanthium strumarium* and *Cynodon dactylon*, in 2006 by *Cynodon dactylon, Agropyron repens, Bromus hordeaceus* and *Achillea millefolium*, and in 2007 the dominant species were *Cynodon dactylon, Agropyron repens, Bromus hordeaceus, Juncus effussus* and *Achillea millefolium*. Vegetation has coverage of 100% during all the years of the study. The vegetation cover of this grassland is formed in 2005 by 11 species, 17 in 2006 and 26 in 2007. In figure 6 is represented the contribution of the main economic groups of plants from grassland Foieni no. 3. In 2005 grasses have the greatest contribution (52.46%) being followed by other botanical families with 42.43%, legumes are absent, and rushes and sedges have a contribution of 5.11%. In 2006 grasses are increasing slightly as contribution to 57.68%, and other families are decreasing to 35.57%, legumes are absent, and rushes and sedges contribute with 6.45%. in 2007 the contribution of grasses increase in comparison with the values registered in previous years to 63.25%, the other families are decreasing to 29.28%, legumes appear (0.6%), and rushes and sedges have a contribution similar with the previous year (6,87%).

INSAUSTI *et al.* (1999) has obtained similar results with those presented in this work, because on the studied grasslands grasses had participation about equal or greater then the other botanical families from the point of view of surface coverage, with the trend of increase from a year to other.

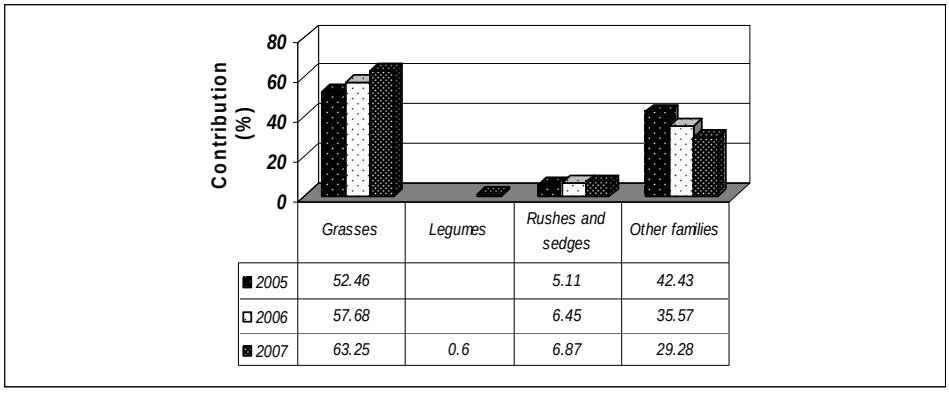


Figure: 6. Contribution of the main technological plants groups in grassland Foieni no.3

CONCLUSIONS

Analysing the results obtained in this study we can conclude the following:

- vegetation cover has in the first year different coverage indexes, this being influenced by the duration of the water stagnation;
- vegetation was recovering complete as coverage in all the grassland starting with the second year of the research;
- grasses have a higher or contribution, or they are in a similar proportion with the species from other families;
- legumes are missing in some cases in the first two years of study, but in all the cases they appear in the third year;
- rushes and sedges appear to show the water excess of the studied grassland surfaces.

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