

INFLUENCE OF THE MEADOW MANAGEMENT ON *ARNICA MONTANA* L. SPECIES

IOAN ROTAR, FLORIN PĂCURAR¹, ROXANA VIDICAN¹, ANCA BOGDAN¹

¹ University of Agricultural Science and Veterinary Medicine, Cluj, Plants Science Department, Grassland and Forages Crops Disciplines, No 3-5, Mănăștur Street, 400372 Cluj-Napoca, Romania, rotarioan52@yahoo.com, fpacurar@gmail.com, roxanavidican@yahoo.com, ancadorinabogdan@yahoo.com

Key words: *grassland management, Mountains, biodiversity, Arnica montana L.*

ABSTRACT

Management practices fulfill different functions in grassland systems and generates functional diversity of plant communities. Semi-natural grasslands in the Apuseni Mountains meets a variety of herbs, including the *Arnica montana* L. species, Natura 2000 species list, Appendix V, code 6230. To highlight this point in 2009 we installed an experience in Garda de Sus village, Alba county, Apuseni Mountains. Management is generating major changes in grassland diversity and thus tried to follow the effect on *Arnica montana* L. Experience has 5 variants by 5 repetitions, which are: V1 abandoned pasture; V2 - traditional mowing, V3- early mowing, V4 - mowing twice per year; V5- mimicking grazing by repeated mowing. Number of inflorescences per stem flowering and number of flowers per stem is influenced by grassland management.

INTRODUCTION

Most lawns are artificial products of man and his animals. Achieving a balance between pasture and animal maintaining and continuously improving vegetation. Only by conducting mutual interaction between the two factors - plant and animal - to obtain positive economic results (Rotar and Carlier, 2010). Grasslands of a secondary order in Garda de Sus village exploiting by mowing, grazing or mixed. Meadows around the houses are cared for and give better yields of dry matter (DM) higher, while those further away are less kept and give a lower production (Pacurar, 2005).

Grasslands of the Apuseni Mountains have a high phytodiversity (Michler *et al.*, 2005) which is strongly influenced by management applied (Stoie, 2011). *Arnica montana* L. is emblematic species of the region. Species *Arnica montana* L. is an important medicinal plant, it's flowers being used in pharmaceutical and cosmetic purposes (Pacurar, 2008). Her collection of spontaneous, the European Community space is practiced only in Romania and Southern Spain.

Arnica montana L. occurs in nutritionally poor meadows, low productivity and exploited extensively used as pastures and meadows. Meadows are part of a traditional subsistence management system based on high diversity. This type of grassland is threatened by intensification (especially fertilizers), abandonment due to migration to other areas or reforestation (Project PN II IDEI, ct. 1099). Currently, farmers need to obtain grass harvest hay for feeding horses and cattle. But it is more convenient for farmers to fertilize hay meadows some to increase production rather than continuing operation of all the extensive grasslands grueling work conditions. This dynamic process has already begun with moderate fertilization of pastures and meadows abandoned more because residents do not need hay or they are too old to mow. Currently, socio-economic and land use is changing. Consequently, the total area covered by grasslands exploited extensively oligotrophic and low productivity and the amount of *Arnica montana* L. appeared in grasslands will decrease. In parallel, *Arnica* pressure on remaining populations will increase.

MATERIAL AND METHODS

Experience whose results we present, was located in 2009, in the area called "Poienile Ursului" in Garda de Sus village, Alba county, at an elevation of 380 m, an exhibition and a southern slope of 5 %. The experiment was located by the method of experimental technique. There are 5 different experience that includes the 5 repetitions, we studied the frequency of mowing lawns *Arnica montana* L. The experimental variants are: V1 abandoned pasture; V2 - traditional mowing, V3-early mowing, V4 - mowing twice per year, V5-mimicking grazing by repeated mowing.

Experience has been placed on the type of lawn *Agrostis capillaris* - *Festuca rubra* type that is specific nemoral floor, undergrowth of beech forests with coniferous and mixed beech (Țucra et al., 1987), led by Braun-Blanquet 1932. Experimental field was delimited to remove any dangerous or undesirable grazing and was cleared of woody vegetation and rocks. Monitoring of *Arnica montana* L. inflorescences of experience was as follows: in each variant was one of the floriferous stems number and total number of flowers. By extrapolating the data we calculate the number of flowers per flowering stem.

RESULTS AND DISCUSSION

Established protocol was mowed following: V2 (traditional mowing, after 1 august, when species *Arnica montana* L. has formed seeds), V3 (early mowed when Poaceae family was done with flowering stage) and variant V4 (variant mown twice per year). This collection has influenced the presence of *Arnica montana* L. in canopy as shown above for the number of inflorescences. In first variant, in the abandoned coverage of *Arnica montana* L. is 4.8% higher than in mown early variant, which is explained by the fact that we are only in the third experimental year. In variant 1, which one does not mowing ever, the coverage of *Arnica montana* L. is 4.8 % higher than in mown early variant, which is explained by the fact that we are only in the third experimental year. In the second variant is the variant that traditional mown, in august, and in this variant the coverage of *Arnica montana* L. reached 7.3 %, while in variant V3, mowing early (23 June 2011), the degree coverage of *Arnica montana* L. was 3.2 %. In V4 variant (variant mowed twice per year) the coverage of the species reach 9.8 %, the highest level of coverage, as expected.

In variant mowed repeatedly the coverage of *Arnica montana* L. is 9.0 % less than in traditional mown variant, but unlike other high variations.

By calculating the average number of flowers per stem showed 1.55 flowers / flowering stem. Thus abandoned variant (V1) we see that the lowest number of inflorescences of *Arnica montana* L. and the lowest number of floriferous stems, which shows high diversity grassland abandonment risk (Table 1). In traditional mown variant (V2) in the five repetitions, we have 95 stems and 157 floriferous inflorescences, which all are present only in the second repetition.

In early mown variant (V3) have the same number of floriferous stems as with the traditional mowed but a number of smaller inflorescences, 141. In this variant the floriferous stems and number of inflorescences are distributed in the first three rehearsals most, but is the only way in which there is a single flowering stem flower stem and fifth repetition.

In variant mowed twice a year (V4) have the highest number of floriferous stems (223) and hence the largest number of inflorescences (350). We realize this impressive number grassland management, ie due to mowing. Floriferous stems are distributed only in the first three repetitions.

In variant that mimics repeated grazing by mowing (V5) we have a total of 98 stems and 139 floriferous flowers, distributed in the first and second repetition.

Table 1

Monitoring of *Arnica montana* L. inflorescences of experience in 2011

Rehearshals	V1-stem	V1-flower	V2-stem	V2-flower	V3-stem	V3-flower	V4-stem	V4-flower	V5-stem	V5-flower
R1	0	0	0	0	72	90	45	64	95	136
R2	6	11	95	157	6	14	153	256	0	0
R3	5	7	0	0	16	36	25	30	3	3
R4	0	0	0	0	0	0	0	0	0	0
R5	0	0	0	0	1	1	0	0	0	0
<i>Total</i>	<i>11</i>	<i>18</i>	<i>95</i>	<i>157</i>	<i>95</i>	<i>141</i>	<i>223</i>	<i>350</i>	<i>98</i>	<i>139</i>

CONCLUSIONS

Mode use influence floristic composition of grasslands. Through an analysis of vegetation on the five repetitions, we find that there are significant differences between different groups of plants as a result of management applied. It seems that early and early mowing unfavorable influence on the presence of 4.8% *Arnica montana* L. in first variant and 3.2% *Arnica montana* L. in variant 3 (early mowing).

Beneficial influences variants are mowed twice a year (V4, 9.8 % *Arnica montana* L.) and pasture (V5, 9.0 % *Arnica montana* L.). And traditional mowing in August, favoring species, *Arnica montana* L. having a share of 7.3 % in V2.

BIBLIOGRAPHY

Braun– Blanquet, J. – 1932, *Plant Sociology, the study of plant communities*, Ed. Mc-Graw – Hill Book Company, Inc. New – York and London, 31-33.

Doniță, N. Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., Biriș, I.-A. – 2005, *Habitatele din România, Programulu Natura 2000, Anexa V, codul 6230*, Editura Tehnică și Silvică, București. ISBN 973-96001-4-X.

Michler, B. – 2005, Proiectul „*The productivity and biodiversity of natural meadows with Arnica montana L. from Apuseni Mountains*“.

Păcurar, F., Rotar, I., Michler, B., Vidican, R. – 2008, *Traditional management of Arnica montana L grasslands*, Grassland Science in Europe – Biodiversity and Animal Feed, Book of abstracts, Uppsala, Suedia, pg. 28

Păcurar, F. – 2005, *Cercetări privind dezvoltarea sustenabilă (durabilă) a satului Ghețari, comuna Gârda prin îmbunătățirea pajiștilor naturale și a unor culturi agricole*, Teză de doctorat -USAMV Cluj-Napoca.

Rotar I. & Carlier L. (2010). *Cultura Pajiștilor*, Editura Risoprint, Cluj-Napoca, ISBN 978-973-53-0420-1.

Stoie, A. – 2011, *Cercetări asupra ecosistemelor de pajiști cu Arnica montana L. în bazinul superior al Arieșului*. Teză de doctorat -USAMV Cluj- Napoca.

XXX - Proiect PN II IDEI, (2008-2011), cu titlul *Conservarea ecosistemelor de Arnica montana L prin folosire sustenabilă*, ct. 1099, finanțat de C.N.C.S.I.S., director proiect, prof. Dr. Ioan Rotar, USAMV Cluj-Napoca.