Permanent Grassland History Researches in Maramureş

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Abstract

In the main part of the 20th century, research on plant nutrition was focused on inorganic nutrients, its foundations being laid by the 19th century chemist Justus von Liebing who identified the essential nutrients responsible with plant growth and promoted the use of mineral fertilizers. Although in the middle of the 20th century plant nutrition was focused on mineral fertilizers, organic nutrients still have a long history of use in agriculture and research in this field established fundamental knowledge.

Permanent grasslands in Maramureş were the object of study and research from old times because of the vast area and the richness in herbal and wood species – as a result of the influence of the ecological conditions. The research conducted in the area can be divided in three periods - independent on the type of fertilizers used in the process - studies carried out during the 19th century, studies held in the 20th century and the ones in the 21st century which are developed on the concepts of ecology and sustainability to support public policies and provide environmental benefits. Although the first two periods of research in Maramureş are rich in providing information on the flora in Rodna Mountains, Ţibleş Mountains, Borşa etc. and on grassland development in the area, in the last century the research scale decreased making this space auspicious for developing new data in the field.

Keywords: grassland, Maramureş, mineral, organic, research

1. Introduction

One way to improve sustainable agriculture is to use existing resources and technologies better by finding synergies between plants, soil, climate and management practices [1]. Recent challenges in the field concern the environmental protection and the safety of the nourriture and a way to ensure these needs is by adopting the ecological strategy in producing and processing materials, in this case, the sward. It is worthy of note that the rediscovery of organic nutrients as a source of essential nutrients did not come from agriculture but from ecology after agricultural research under government direction had the industrialization of agriculture assigned as its chief task [2].

Research concerning vegetation and grassland in Maramureş area began two centuries ago, due to the complex area and the richness of the flora. Most of the studies undertaken here regarded the description of the vegetation in different geographical structures. Along with the accumulation of knowledge in the field of the vegetation in Maramureş, research developed to drawing technologies by improving permanent grassland and founding temporary ones.

2. Evolution of research in Maramureş

By reviewing these studies conducted, they can be grouped in three periods, the first one being carried during the 19th century. During this period,

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Maramureş territory was scoured by a notable number of botanists, like Baumgarden who conducted studies in Gutâi and Rodna Mountains, describing the *Aulocamium turgidum*, *Hesperis nivea* and *Aster alpinus* [3]. Another number of famous botanists, Sadler, Kotschy, Stur, Schur, Herbich and Hazslinszky [3] describe flora species in Rodna and Maramureş Mountains (*Draba kotschy, Melandrium zawadzkii, Silene dubia, Senecio carpatius, Euphorbia carpatica* etc.). During the next years of the 19th century, description of the flora in Maramureş area is continued by Porcius [4], Czetz and Wagner, who publishes in 1876 [5] a list of 976 species of plants and mentions the areas in which the plants are wide-spread. The research is completed at the end of the century by Woloszczak who notices in Baia-Borşa *Hieracicum x pocuticum*, and *Euphorbia carpatica* in Gutâi Mountains, and by Pax who publishes "The spreading foundations of plants in Carpaţi Mountains" [3].

The next period of research in Maramureş is carried out during the 20th century which is richer in knowledge not only about the vegetation, but also about technologies in increasing output in permanent and temporary grassland. Concerning the vegetation in Maramureş, there is a great number of researchers who studied the flora, important personalities like Borza, Buia, Coman, Pop, Prodan, Morariu, Stefureac, Peterfi, Nyarady, Moldovan, Resmeriţă, Coldea, Lăpuşan [3]. These researchers carried out studies on the vegetation in different areas of Maramureş and starting with 1970, they were also preoccupied in developing experimental fields in parallel with the description of the flora. This period is characterized by enhancing research in increasing output in grasslands, mainly after 1972 when S.C.P.C.B. Sighet was founded. The aim of the experiments conducted here was the use of the grasslands in a modern and ecosystemic vision. Researchers who developed studies during this time were Puia, Kovacs, Neacşu, Erdelyi, Rotaru (1988-1990) and Mihai (1998) [3].

Concerning studies developed in the 21st in Maramureş, there are fewer in the field of grassland compared to prior periods. There are researches on the Holocen vegetation in the area conducted by Farcaş (2013) [6], and a study on the Taxaceae remains of the late Miocen flora by Macovei (2013) [7]. In 2011 Criste [8] studied the effect of different types of fertilizers (organic and mineral) on the output of permanent grassland in Petrova, Maramureş and there is also another experimental field in the area regarding the use of organic fertilization on permanent grasslands.

Due to the recent interests in organic farming, food development and latest research in grassland in Maramureş, there are past studies on organic fertilizing in Romania and Europe which are significant for predicting future results and expectations from the studies carried out. As recent literature in organic fertilizers, in 2010 Maruşca [9] added to it a guide for producing ecological forage from mountain permanent grasslands.

For the case of Romania, there was an experiment conducted between 1998 and 2000 in the Cindrel Mountains by Sima and Păcurar who studied the quality of forage from a mountain pasture (*Festuca rubra - Agrostis capillaris* meadow). Two experiments arranged by randomized blocks were organized, containing the same variants, but with different usages – grazing and cutting [10].

The second observation taken into account for predicting future results on the ongoing research is one from Slovakia. The trial here took place in Suchý vrch, near Banská Bystrica, which was established by the method of block at permanent grassland [11]. The application of manure treatments on the variants were as follows: treatment 1 (V1) non-fertilized; treatment 2 (V2) 8 t/ha manure; treatment 3 (V3) 16 t/ha manure and treatment 4 (V4) 24 t/ha manure applied in the autumn of 2006 [11]. In comparing results for the two case studies, it will be taken into consideration the organic matter digestibility because of the importance of quality in forage.

Due to the type of grassland in the first case study in Cindrel Mountains and the type and method of fertilization in the second case, it is expected a similar result in the trial in Petrova, Maramureş. In the first case, the percentage of the organic matter digestibility increased in the second year of the trial, the best percentage being obtained in the variant treated with N100P22K83 kg ha^{-1} yr^{-1} [10].

In the second case study which took place in Slovakia and the treatment was exclusively organic, the most important percentage of organic matter digestibility in the herbage was obtained in the fourth variant, the one treated with 24 t/ha of manure. Comparing these two cases, the organic fertilizers have an important influence on the percentage of organic matter digestibility and they

also have an impact on the floristic composition of the pasture and on the chemical composition of the grass.

3. Conclusions

During the last three centuries, there were a significant number of studies in the area of Maramureş due to the complexity of the ecological factors that influence the vegetation there. The research began by describing the flora in the location by important botanists and researchers of that time and only after the year 1970 there were installed experimental fields to ensure the proper development of technologies for improving permanent and temporary grasslands.
Trials continued over the years and because of the social and environmental trend of producing better products for consumers and conserving the environment, research followed this trend and adapted to today's needs. As a result, the ongoing researches in Maramureş are concerned with obtaining better forage (qualitative and quantitative) by using organic fertilizers and preserving the haleness of the area.
In order to do so, studies must be taken into consideration in this field, not only the ones which already took place in Maramureş, but also the ones related to the subject developed there on the fact that similar results should be obtained given the resemblance of stages in the research development.

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