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SUSTAINABLE MANAGEMENT PERMANENT GRASSLANDS

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Abstract

The Natural complete ecosystem, the original form of development of human society has changed due to the adoption of diversified development options, mainly oriented towards production systems designed to erode the harmony between man and nature. As a consequence of these changes, we are witnessing today an increase of the probability of manifestation of nuisance factors, namely harmful and the vulnerability of human society to their action. The global reaction to this situation, though delayed, is notable and oriented towards the adoption of specific actions intended to produce change towards a environmentally friendly economy. This change, called sustainable development, is a topical issue of maturity and depth and this paper highlights the necessity to successful management of resources for grassland agro ecosystems in order to meet people's changing needs, while maintaining or improving the quality of the environment and conserve natural resources.

Key words**:** *agroecosystem, development, environment, resources, sustainable*

INTRODUCTION

Sustainable agriculture aims to increase production capacity while maintaining the natural resource base, which requires the adoption of a management oriented towards the changing needs of people, while maintaining or enhancing environmental quality and conservation of natural resources [2].

The adoption of such management has as a basis the fact that the agricultural economic organization operates in an artificial ecosystem, which requires monitoring and management by well-defined rules, so that it's bioproductivity remain constant or increases [4].

It is about the agricultural ecosystem composed of specific subsystems, our attention being focused on grassland agro ecosystem and its object of study presenting features of its sustainable management. To develop sustainable grassland agro ecosystem supposes to design and implement economically viable measures over a long period of time, able to provide both high yields and conserve resources and protect the environment.

Design and implementation of such measures is supported by the adoption of sustainable management of land use, i.e. inclusion of activities in addition to those specific to the agricultural management dedicated to the stimulation of local biodiversity, rural development and its integration into a harmonious environment, a friendly ambient. The development of such a management process is achieved by the implementation of many operations, grouped into stages, characterized by specific content whose study requires understanding how to influence the majority of the workforce in achieving the targets in line with the skills acquired by them and the job requirements [6], and in order to avoid pollution and environmental degradation. The sustainable management of grassland agro ecosystem provides the organization, management and administration, as opposed to natural ecosystems that automatically organize, because they can not be maintained without human action, that intervenes with external energy called energy crops under two forms: necessary biological

energy (human labor and its animals) and technological (interference machinery, equipment, etc) depending on the amount of shares in the meadow extensive grasslands (pastures and permanent grassland) and intensive (sown pastures)[8].

MATERIALS AND METHODS

The study conducted and presented in summary in this paper is based on observations and analyzes conducted during 2010 - 2012 in terms offered by the Area Mountains of Cindrel, Sibiu County. The study shows that permanent mountain meadows are an important forage resource for maintaining sheep, horses and other domestic animals during the growing season [1].

Observations were made on the fields located within the locality Sălişte, a Town of Sibiu Borders pennant, area where livestock is the basic concern of residents. Diagnosis grasslands mentioned in the area indicates the existence of a process of pollution and damage to them as a result of human activities and natural phenomena such as excess of moisture, drought, salinization, erosion, etc.. Thus, we face an alarming situation that requires action accordingly, aimed at restoring permanent grassland in order to introduce the economic cycle and to ensure continuity of environmental, technological and economic aspects for the agro ecosystem. For permanent grassland restoration it is required a very good knowledge of the phenomena underlying the erosion and the organization of a sustainable management, using a series of actions to change the situation. Depending on the state of degradation of the grassland agro ecosystem, we can recommend two approaches: the radical approach and the one of the reconstruction [8]. In the following lines we will refer only to the reconstruction of the permanent grassland.

The objectives of the study undertaken are: grassland agro ecosystem management integration of sustainability principles, namely the life cycle of management of the grassland agro ecosystem and the products obtained should be consistent with the objectives of sustainable management of grasslands [3]. Achieving the objectives is based on the organization of fundamental elements of management because it provides a good relationship between biocenosis and biotope, judicious distribution of species and their protection as well as ensuring continuity of environmental, technological and economic elements as aspects of the agro ecosystem. Another fundamental element of management is controlling (checking) the way in which the activities compare with the standards and programs, detecting and measuring the deviations from them, followed by a description of the causes and remedies for their removal or promoting the positive aspects [5].

RESULTS AND DISCUSSIONS

The permanent grassland considered is located in the commune Sălişte, in the Cindrel Mountains at an altitude of between 1200 - 1300 m, from the point of view of climate being characterized by temperatures ranging from 0.5 to 4.60 C, rainfall of 1000-1150 mm, with brown feriiluviale soils. The grassland fall in the series *Festuca rubra, Festuca rubra ssp comutata* type, *Nardus stricta, Juniperus comunis* subtype, where we can see different associations of dominant species as: *Nardus stricta, Deschamsia caespitosa, Agrostis stolonifera,* and the invasive species are represented by *Pinus mugo, Juniperus comunis, Vaccinium mirtilus, Pteridium aquillinum* and nitrophos species, *Urtica dioica* and *Rumex crispus*.

The meadow analyzed is influenced by ecological factors comprising in two groups: the abiotic factors, represented by light, temperature, air, water (climate factors) soil and orography of the terrain (altitude and landforms) and the biotic group represented by all populations encountered in a meadow and interactions that are established between them. Another factor playing a decisive role in the sustainable development of grassland is the human factor. This occurs through repeated harvesting above-ground parts (hay) or by grazing, changing structural and

functional characteristics of the grassland [7]. For these interventions to determine a positive effect, it is necessary for humans to have sufficient knowledge. Human intervention occurs at the level of producers where there is a change in the state of fertility (fertilizer application), favoring the development of vegetables, i.e. a certain intensity of grazing, as well as at the level of consumers (by the species of animals placed on the lawn).

In summary, to revitalize areas of permanent grassland of Sălişte studied, there were applied specific works of combating fern, of removal of woody species present, both mechanically and manually, autumn and spring fertilization, because it is known that the "mountain meadows fertilization increases the proportion of grass such as exploitation by grazing and mowing, and the vegetables increase in the variant of exploitation by mowing. In experience, it was chosen to use low doses of chemical fertilizers and a widespread use of the organic ones.

Weed control works undertaken were based on the degree of weed, species biology or how to use the meadow focusing on preventive measures, but there were applied some curative measures as well. Preventive measures were aimed at specific cultural hygiene where, with a rational use of pastures, there were applied measures for a current maintenance of meadows among which we mention clearing away uneaten residues, including here weeds, thus preventing their spreading, also allocating animal manure which leads to the annulment of favorable conditions for azofites and ensuring a proper rotation of grassland use. Curative measures were aimed at destroying weeds generally in a mechanical manner and only on small areas it was chosen a chemically way, adopting the "no herbicides" rule in general.

Over seeding followed, in order to achieve a mixture of forage that is suitable for mixed operation, because in this way, a considerable reduce of losses by leaching is acomplished [9].

This was done both to cover the areas remaining without vegetation because of the removal and destruction of fern, the destruction of shrub or grassy bushes, so that a mixture of the following species can be made: *Lolium perenne, Poa pratensis, Festuca pratensis, Trifolium repens, Lotus corniculatus.* Applying these strategies affects the operating mode, so in the first year areas are operated by mowing and only the last part the vegetation can be grazed rationally, then it is recommended that a cleaning sew of vegetal residues to be realized, at the end of each grazing cycle, and also a work undertaken with weeding for spreading manure.

The impact of such actions on the researched lawn's performance highlight an improvement in production and forage quality, motivaded by: if in the initial phase the production of green mass calculated for alternative grazing operation ranged from 10 to 12 mv t / ha, which corresponds to an emissions volume and efficiency of economic activity [11], the number of animals of 1.5 UVM after the execution of the mentioned works, the level of production ranged between 34-38 mv t / ha, which means an increase of the load of animals of 4.8 UVM / ha. The measures and works undertaken should ensure a positive relationship between the economic and ecological balance, measured from a perspective of consumption of natural resources.

CONCLUSIONS

The sustainable development of grassland agro ecosystem is complex and time that can not be provided without the application, in an organized manner, of a set of measures and works to ensure soil protection and sustainable reconstruction of degraded lands. To develop sustainable grassland agro ecosystem supposes a design and a implementation of measures that are economically viable over a long period of time, meaning the adoption of a sustainable management of land use, i.e. inclusion of activities that come in addition to those specific in agricultural management dedicated to the stimulation of local biodiversity, to a harmonious rural development and its

integration in an environmental friendly ambient.

The activity developed by the economic agricultural organization in grassland agro ecosystem is a custom one by the fact that it is usually an artificial type, which requires monitoring and management by well-defined rules so that bio-productivity can remain steady or rise while ensuring environmentally friendly ambient. Reconstruction of permanent grassland area is considered necessary due to the condition of degradation and is achieved by implementing specific measures capable of producing change in the soil fertility status, promote legumes in the plant structure and environmental protection.

The operating mode grassland exploiting contributes to sustainable development thereof, for which it is recommended a prerequisites operation combined with a mixture of forage plants that are suitable for mixed operation, which will determine and reduction of nutrient losses by leaching. All measures and reconstruction works carried on grassland agro ecosystems can be filled with a permanent analysis of the impact on three of its features: structural feature, functional feature and environmental feature.

Implementing measures and reconstruction of permanent grasslands, depending on their condition, can ensure a growth of 2 to 3 times the production capacity, i.e. grazing capacity (10 t mv / ha to 30 t mv / ha, respectively to 1.5 LU / ha to 4.6 LU / ha).

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