RESEARCH ON THE PRODUCTIVITY OF THE COUNTRIES FROM N-V OF BIHOR COUNTY, LOCATED ON PSAMOSOLES

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Abstract

The productivity of natural grasslands is largely conditioned by the elements of the natural environment. The research on the productivity of the meadows from the N-V county of Bihor county, located on psamosols was carried out between 1999 and 2018. The values of the climatological elements were provided by the weather stations in Oradea, Săcuieni, Nuşfalău, Pocsaj, Berettzoufalou and Szeghalom. The research, description, and delimitation of the elementary forms of relief from the morphological and morphogenetic point of view were necessary in establishing the distribution of soil taxonomic units. Additional information was obtained directly in the field and in the case of hydrography and hydrogeology on the character of the hydrographic network (permanent, temporary, torrential), frequency and duration of floods, degree of water mineralization, presence of stagnant water (its nature, degree of mineralization, period occurrence, extension, duration).

Key words: soil genetic type, climatic regime, relief, plant associations, productivity

INTRODUCTION

The research territory presents the following geographical coordinates: 47 degrees, 18 minutes, 24 seconds latitude and 21 degrees, 52 minutes, 43 seconds longitude, being located in the northwestern part, Bihor County, being geographically located within to the Crişuri cross-border river basin, to the Barcau river basin. From the hydrogeological point of view, the territory of the city of Şimian is included in the structure of the Dune Plain (Măhăra, 1972; 1977; Pop, 1968; Pop, 2005; Posea, 1997)

It is located in the High Plain of the Nir, the limit being in the Voievozi localities - the west of Valea lui Mihai, Pişcolţ, continuing with a transition area that connects with the corridor of Ier. The appearance is cloudy, due to the sand dunes of wind nature, deposited on a layer of impermeable clays. The groundwater is at depths between 5 - 10 m in areas with dunes, reaching critical depths of 0 - 4 m on the lands between dunes, with flows between 0.2 - 0.6 l/s. The leakage occurs through fine and medium sands, located under the impervious clay layer (Florea, Munteanu, 2012; Ianoş, 1999; Rogobete, 1993; Rogobete, Ţărău, 1997; Sabău, Domuţa, Berchez, 1999; Petrea, 2001; Miclăuş, 1991).

From a geomorphological point of view, the territory of Şimian locality occupies a plain relief, located within the Valea lui Mihai Plain.

MATERIAL AND METHOD

He first operation performed in the field was the general recognition of the territory for the purpose of spatial delimitation, confrontation of the situation on the ground with the one resulting from documentation, identification of the main physical-geographical units and establishment of the working itineraries so that all the main relief, lithology and vegetation formations, following the correlation of the soil cover with the natural factors (Berchez, 2015; Blaga, Rusu, Udrescu, Vasile, 1996; Canarache, 1980; Canarache, Merculiev, Dumitru Rozalia, Trandafirescu, Chiochiu, Miciov, 1971; Sabău, Domuța, Berchez, 2002; Șandor, 2007).

The research, description, and delimitation of the elementary forms of relief from the morphological and morphogenetic point of view were necessary in establishing the distribution of soil taxonomic units.

In this phase, besides the data obtained in the documentation stage, detailed observations were made regarding surface lithology, hydrography, hydrogeology and vegetation.

RESULTS AND DISCUSSION

The mapping works carried out led to the identification and research of 39 soil units, belonging to 3 classes: Protisols, Cernisols, Cambisols and Hydrosols. The study area is included in the climatic province Cf, the sub-province Cfbx, with the average of the hottest month between 20 and 22 degrees Celsius and with the maximum precipitation in early summer. Aridity index values range from 25 to 30.

For the analysis of the spatial distribution of rainfall, data provided by the National Environmental Agency for the weather stations in Săcuieni (the meteorological station in Nuşfalău was closed in 2001) and the data provided by Ticovizig Debrecen for the Pocsaj station.

For the determination of the average annual precipitation quantities (average annual precipitation), a period of 20 years has been taken into account, based on the data provided by the Săcuieni Meteorological Station. Thus for the Săcuieni weather station there is an annual average rainfall of 621 mm, for Oradea 631,73 mm and for Pocsaj 608.36 mm. The study territory benefits from a climate characterized by annual average rainfall similar to the values recorded at the Săcuieni Meteorological Station, with an average of between 610 and 645 mm with oscillations from one year to another. In Fig. 1 is graphically represented the evolution of the average annual precipitation quantities recorded between 1999 and 2017 in the N-V part of Bihor County.

The average number of days with snow covered soil in the observation area of the five stations studied is approximately 35 days, with the snow

layer having a protective role on the soil, influencing the thermal conditions and implicitly the specific biochemical processes.

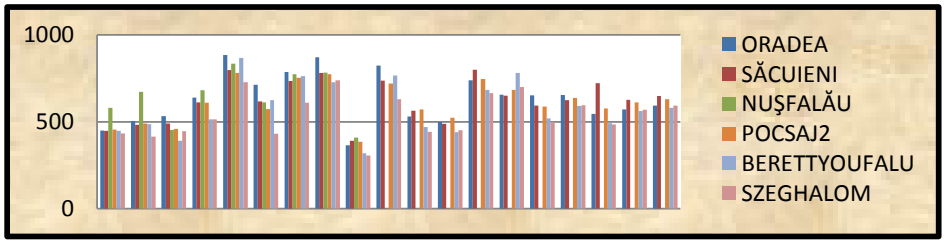

Fig. 1. Graphical representation of average annual rainfall amounts recorded in Săcuieni
(Source: National Environment Agency and Tikovizig Debrecen)

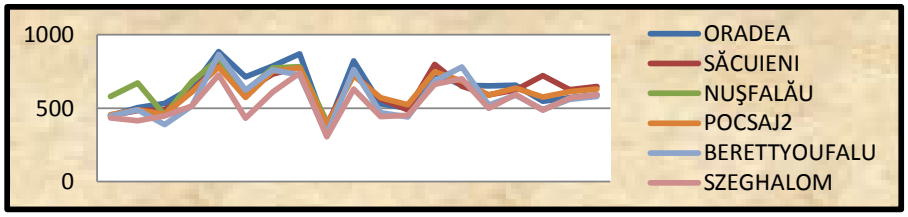

Fig. 2. Evolution of annual average rainfall in Săcuieni
(Source: National Environment Agency and Tikovizig Debrecen)

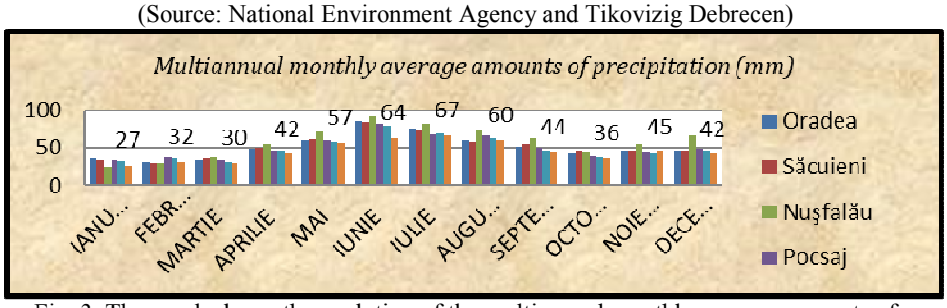

Fig. 3. The graph shows the evolution of the multiannual monthly average amounts of precipitation in the N-V part of Bihor county
(Source: National Environment Agency and Tikovizig Debrecen)

Precipitation by their value and character (long-term precipitation, torrential rainfall, precipitation whose values exceed the average values) can negatively influence the physical, chemical and biological properties of the soil, having direct pedological, hydrological and ecologically, following the orientation of the pedological processes in the direction of smoothing, debasing, acidifying and stagnogleizing.

The air temperature presents variations in time and space, being the result of the complex interaction between the solar radiation, the atmospheric circulation and the peculiarities of the active surface. The temperature regime was studied for the period 1999-2017, based on data transmitted by the National Meteorological Agency, (for the stations Oradea, Nuşfalău and Săcuieni) and Tikovizig Debrecen (for the Debrecen station).

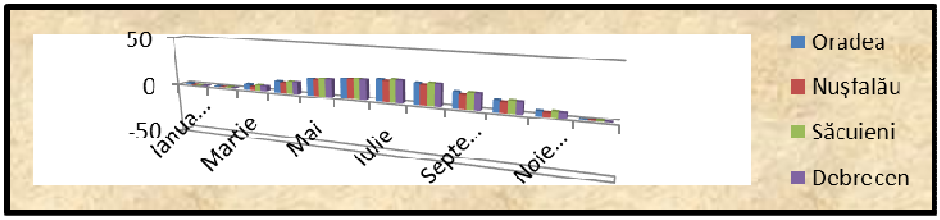

Fig. 4. Multiannual monthly average air temperature (ºC)
(Source: National Environment Agency and Tikovizig Debrecen)

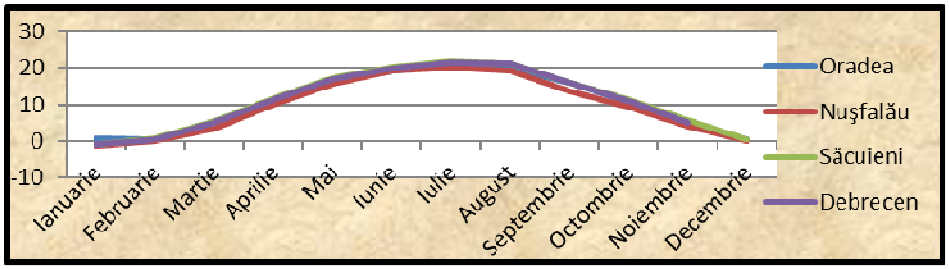

Fig. 5. Multiannual monthly average temperature variation (° C)
(Source: National Environment Agency and Tikovizig Debrecen)

For the studied territory, there is a minimum in January (Oradea -0.9 ºC, -1.24 ºC- Nuşfalău, -0.82 ° C-Săcuieni, -0.96 ºC-Debrecen) and a maximum in July (Oradea-21 ° C, Nuşfalău-20.01 ° C, Săcuieni-21.79 ° C, Debrecen-21.52 ° C).

The highest annual average temperatures are recorded in the Hungarian territory at Debrecen (° C), and the lowest in the Romanian territory at Nuşfalău station (ºC). The average annual temperatures have values between 8.3 ºC in Nuşfalău (1996) and 12.3 ° C in Săcuieni (2000). There is a relative uniformity of values for the stations Oradea, Săcuieni and Debrecen. The number of summer days (max. 25 ºC) was between 93 and 97 in Oradea, Săcuieni and Debrecen and 82 in Nuşfalău.

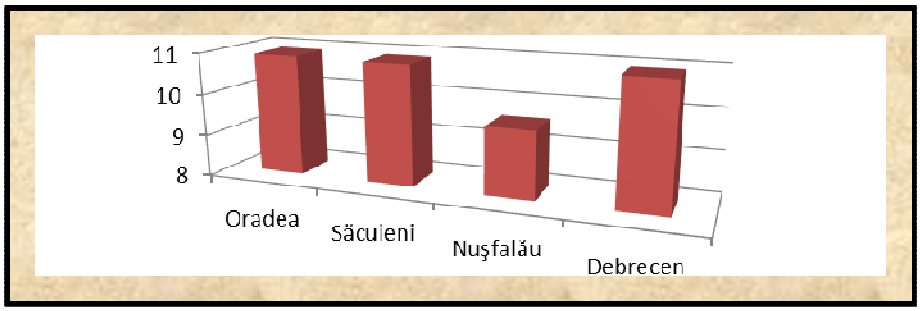

Fig. 6. The multiannual average air temperature (° C).
(Source: National Meteorological Agency and Tikovizig Debrecen).

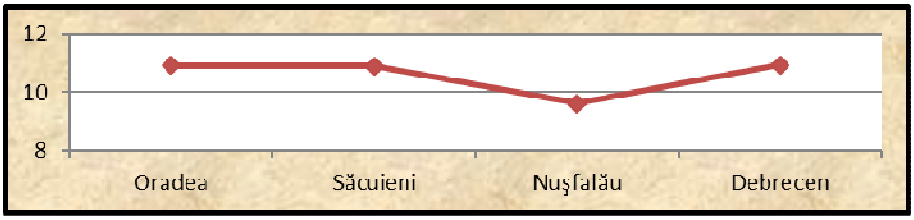

Fig. 7. Variation of the average annual air temperature (ºC)
(Source: National Meteorological Agency and Tikovizig Debrecen)

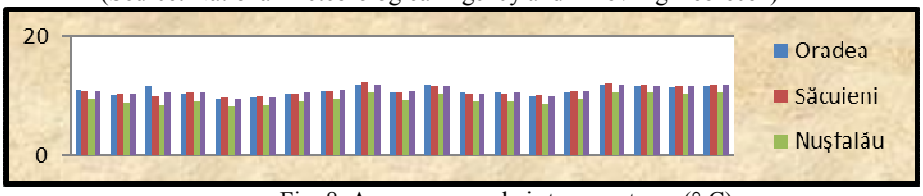

Fig. 8. Average annual air temperatures (° C)
(Source: National Meteorological Agency and Tikovizig Debrecen

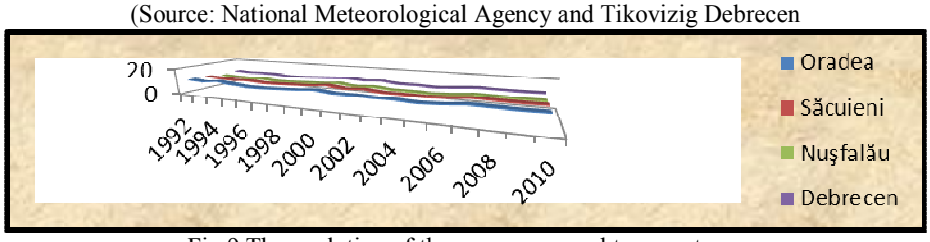

Fig.9 The evolution of the average annual temperatures
(Source: National Meteorological Agency and Tikovizig Debrecen)

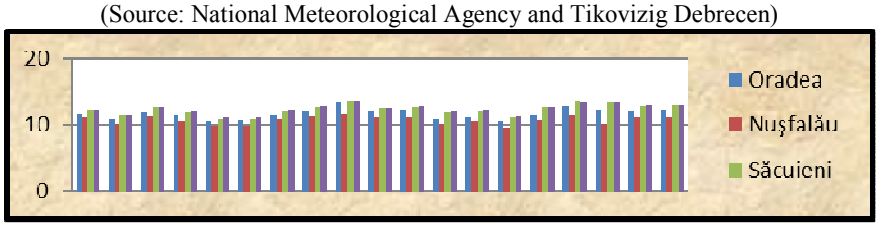

Fig. 10. Average annual soil temperature 1999-2017 (gr C)
(Source: National Meteorological Agency and Tikovizig Debrecen)

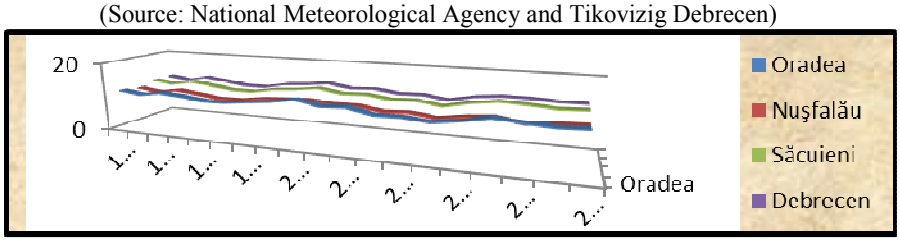

Fig. 11. Annual average temperature variation (gr.C).
(Source: National Meteorological Agency and Tikovizig Debrecen)

The number of winter days (max. 0 ° C), for Oradea Săcuieni and Debrecen was between 26 and 29 and for Nuşfalău 38.

The number of frost days ranges from 93 to 101 in Oradea, Nuşfalău and Debrecen and a maximum of 118 in Nuşfalău. The average annual temperature of the soil registers a maximum in 2007 with an average of

13.07C (Oradea-13.4C, Nuşfalău-11.6C, Săcuieni-13.6C, Debrecen-13.7C), and a minimum in 2012, with an average of the four stations of 10.62C (Oradea-10.6C, Nuşfalău-9.8, Săcuieni-11C, Debrecen-11C).

The multiannual average temperature on the surface of the soil records values between 10.76 ° C and 12.58 ° C (Oradea-11.64 ° C, Nuşfalău-10.76 ° C, Săcuieni-12.3 ° C, Debrecen-12.48 ° C).

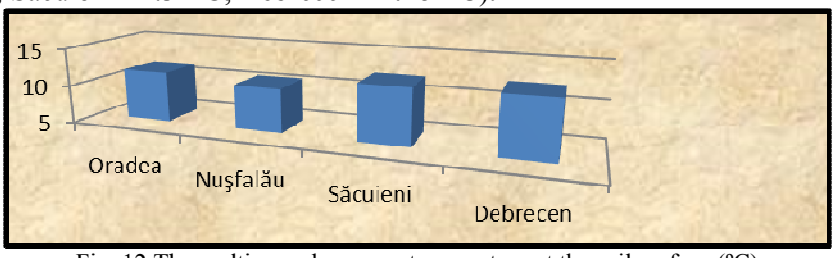

Fig. 12 The multiannual average temperature at the soil surface (ºC)
(Source: National Meteorological Agency and Tikovizig Debrecen)

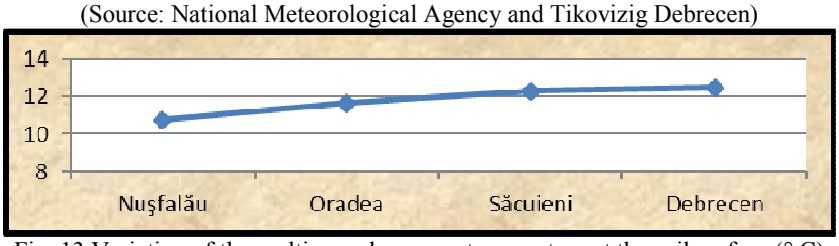

Fig. 13 Variation of the multiannual average temperature at the soil surface (° C)
(Source: National Meteorological Agency and Tikovizig Debrecen)

The average monthly temperature at the soil surface during the study period 199â9-2017 presents minimum values at Nuşfalău station (-1.9 ºC) and maximum values at Oradea station (-1.1°C).

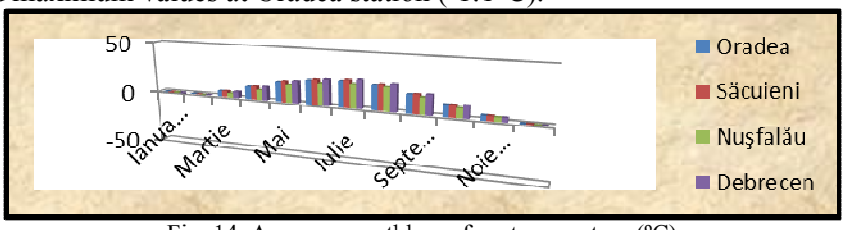

Fig. 14. Average monthly surface temperature (ºC)
(Source: National Meteorological Agency and Tikovizig Debrecen)

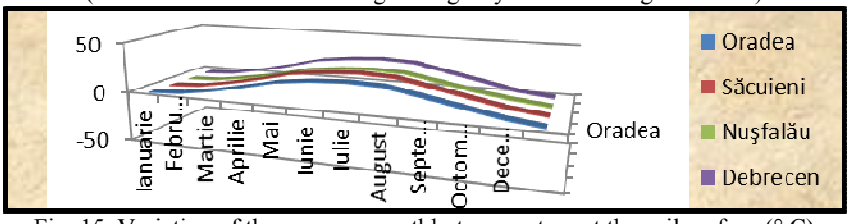

Fig. 15. Variation of the average monthly temperature at the soil surface (° C)
(Source: National Meteorological Agency and Tikovizig Debrecen)

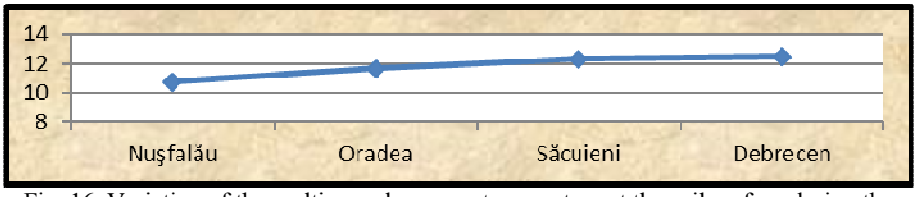

Fig. 16. Variation of the multiannual average temperature at the soil surface during the period (° C)
(Source: National Meteorological Agency and Tikovizig Debrecen)

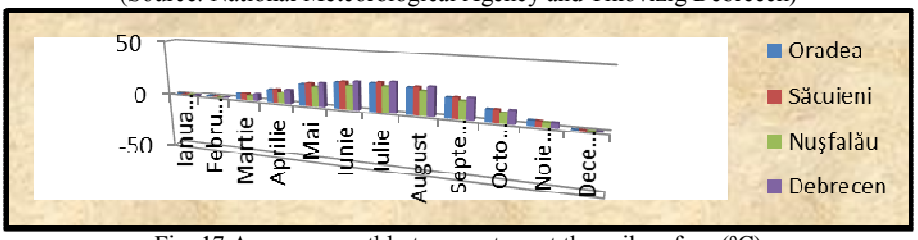

Fig. 17 Average monthly temperature at the soil surface (°C)
(Source: National Meteorological Agency and Tikovizig Debrecen)

The negative action is manifested as a result of the wind erosion process, recorded at the bioaccumulative horizon level.

Within the study area, the wind action in soil formation and evolution is minimal, during the study period for Oradea station the minimum average frequency was 4.7m/s in the NE direction and maximum 18.2m/s in the S. direction. The average minimum săcuieni was 1.7m/s in the NV direction and the maximum of 9.8m/s in the NE direction.

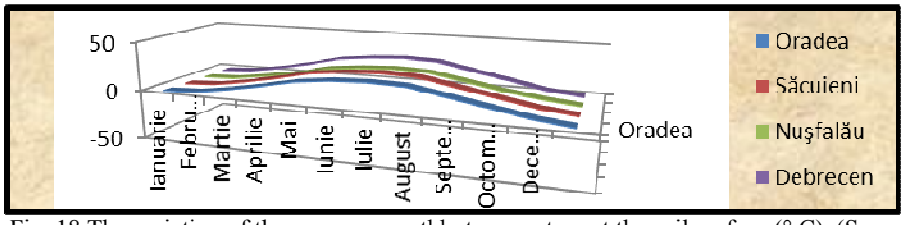

Fig. 18 The variation of the average monthly temperature at the soil surface (° C). (Source: National Meteorological Agency and Tikovizig Debrecen)

Debrecen station has maximum values of maximum values of 10.4m/s in the NE direction and minimum values of 1.9m/s in the NV direction. The average wind speed for all four stations had a minimum value of 2.2m/s in the E direction and maximum values of 4.2m/s in the SV and S direction.

The average monthly temperature at the soil surface for the study period 1999-2017 presents minimum values at Nuşfalău station (-1.9°C) and maximum values at Oradea station (-1.1°C).

Characteristic of this subzone is the fact that over time, primary steppe vegetal associations have been replaced with agricultural crops or with secondary herbaceous vegetation, often degraded or ruderalized.

CONCLUSIONS

In order to achieve high productions of fodder and of a suitable quality, the grass carpet of the permanent (natural and semi-natural) and temporary (sown) grasslands needs to be supported by fertilization (organic and / or chemical) and, as the case may be, the correction of the soil reaction by fine-tuning.

The most important factor of degradation of the grass carpet is the lack or excess of fertilizing elements of which nitrogen, phosphorus and potassium (NPK) are noted. For the production of one ton of dry matter (SU) the equivalent of 4-5 tons of grass per harvest (hay or grass), from the soil is extracted on average 20 - 25 kg N, 2 - 3 kg P, 22 - 25 kg K and 4 - 5 kg of calcium. The quantities of fines used to correct the soil reaction are calculated according to the value of the hydrolytic acidity. The average quantities of fertilizers, kg/ha/year, expressed as active substance required for grassland fertilization are: 150 kg N, 50 kg P2O5 (P), 60 kg K2O (K) active substance

When dealing with an arable crop when fertilizing a meadow, we must take into account several specific features, such as:

- the spread of meadows under more special seasonal conditions,
- the slope of the slopes up to 30 - 500,
- soils with physical-chemical handicaps (gravel, sand, salt, high acidity, excess humidity, etc.);
- the large number of perennial species that make up the grass carpet;
- several harvest cycles or permanent removal by grazing in a season of vegetation;
- use by mowing, grazing with animals or mixed, in one year or differentiated by years;
- maintaining an optimal balance between perennial grasses (50-60%) legumes (35-40%), species from other families (5-10%);
- the conservation of biodiversity;
- ensuring optimum and multifunctional density of grass carpet for erosion protection, water and thermal balance, landscape aesthetics, increased carbon sequestration capacity and more, besides the main role of ensuring high quality, cost-effective feed production reduced.

The first and most important fertilizer resource for meadows is organic fertilizers (manure, compost, turbidity, urine, etc.).

In view of the great diversity of the component species in the grass meadow and the varied ratio of them, first of all for fertilization it is necessary to know:

• floristic composition of grass carpet;
• the main agrochemical characteristics of the soil such as pH, degree of

saturation in bases (V%), humus content, P, K, Ca, mobile aluminum, sodium, etc .;
• the level of intensification of the grass production that can be extensive, semi-intensive (medium) and intensive;
• meadows invaded over 20-30% of valuable grass (weeds) and woody (shrubs and tree seedlings) vegetation that need to be removed by different methods, before being fertilized;
• the meadows to be sown, in order not to stimulate the development of spontaneous species that can stifle the young plants that appear from the seed, the fertilization to be done after the first sowing or a grazing cycle;

All types of meadows that have been degraded due to the lack of application of fertilizers respond positively to fertilization, provided they have more than 70-80% valuable fodder species in the grass carpet.

Organic fertilizers include manure, compost, gülle, urine and manure, etc. Manure is a basic fertilizer used in agriculture, consisting of a mixture of animal manure and material used as bedding. The average content in fertilizing elements of this type of fertilizer is: 0.55% N; 0.22% P2O5; 0.55% K2O and 0.23% CaO. The quality of the manure depends on the animal species from which it comes. The application of the well fermented manure (3-5 months in the platform) to the surface of the land, late autumn or early spring in quantities of 20-30 t / ha is frequently done on the natural grass near the farms.

Manure is best utilized when administered in combination with low doses of chemical fertilizers. The effect of fertilizing with manure lasts on average 3 to 5 years. The use of chemical fertilizers on the meadows has produced a true green revolution through large increases in grass production and the quality of the feeds, also reflected in the increase of the number of animals and their productions in the surface unit of the zootechnical farms. The administration in moderate and balanced doses of the chemical fertilizers on the meadows according to the agrochemical characteristics of the soil, the level of production and the intended use mode is one of the most important levers for increasing the productivity of permanent (semi-natural and natural) and temporary (sown) meadows .

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