PRODUCTION POTENTIAL OF FARMLAND IN CENEI, TIMIŞ COUNTY

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Abstract

The basic problems of Banat agriculture, as well as that of Romania and everywhere else, are related to increasing agricultural production and increasing soil fertility. The maximum utilization of the entire agricultural area of Banat requires a thorough knowledge of the natural conditions and, first of all, of soils, as a means of production in agriculture, which synthesize, through their properties, the influence of all natural and anthropogenic factors.

In this context, I set out to review the main natural factors that contribute to the smooth development of agricultural activities in the southwestern part of Romania, especially plant production, with special reference to the soil, this huge „factory" for transforming energy and substances from the environment into plant biomass.

In the complex of measures aimed at the intensive development of agriculture, an important place belongs to the rational use of land. However, given the limited possibilities for expanding agricultural lands, their prudent use and a permanent increase in soil fertility are required.
***Key words**: limiting factors, eco-pedological indicators.*

INTRODUCTION

Previous research on Banat soils was carried out over a long period of time (over 40 years), during which time substantial changes occurred in taxonomy and classification, in mapping and assessment methodology, etc. It is considerated necessary to update the entire accumulated database, which would respond, for a certain period of time, to the practical needs of agriculture, design, environmental protection, etc.

The most complete possible utilization of the large reserves that the land fund has, by removing or limiting the unfavorable effects of natural factors, is the main objective towards which the efforts of many specialists in agriculture in our country and around the world are aimed. Studies and research have highlighted the fact that on two-thirds of the country's cultivated area, it is impossible to conceive of practicing modern and efficient agriculture, which would ensure a high level of plant and animal production without land improvement works. These are large areas with the most fertile soils, but which permanently suffer from drought, erosion, flooding or excess humidity, often on the same land the negative action of two or more factors overlapping, which cause damage to agriculture almost year after year.

MATERIALS AND METHODS

Soil sample collection according to established methodology and from natural sites. Storage and preparation measures for chemical analyses in the laboratory were followed. For solution identification, 1:10,000, 1:200,000 L-34-XXVIII, 1:1000,000 updated synthesis N. Florea 2008 were used. The analysis methods and data interpretation are in accordance with the STAS in force.

RESULTS AND DISCUSSIONS

The commune had the following names: Cene, Csene and Cenei. As a location, Cenei is situated in the southwestern part of the Banat region, Timis county, on the old bank of the Bega River.

Figure 1. Aspect from Cenei Commune, Timiş County

The relief and hydrography of the commune of Cenei and the village of Bobda is entirely a flat plain, fragmented by slight negative forms. These are represented by shallow, zoned depressions, resulting from erosion valleys formed by the flow of flood waters.

Figure 2. Relatively flat aspect of the lands in Cenei

The classification and description of the soils was carried out in accordance with the SRTS 2012 developed by I.C.P.A.Bucureşti

Classification at class and type level of soils in the commune of Cenei

CLASS	SOIL TYPE	SURFACE (ha) %	
PROTISOL	ALUVIOSOL	171,13	2,82
CERNISOL	CHERNOZEMIC	1878,94	30,90
	CERNOZEMIC CAMBIC	1204,85	19,83
PELISOL	VERTOSOL	2556,78	42,04
HYDRiSOL	GLEIOSOL	96,37	1,58
SALSODISOL	SOLONET	172,53	2,83
TOTAL		**6080,6**	**100 %**

ALLUVIOSOL TYPE

Characterization. The solification material of alluvial soils, represented by fluvial deposits, is characterized by a pronounced inhomogeneity, both in profile and in space.

Alluviosols are found predominantly on flat or gravelly landforms. They also occur, isolated, on depressional landforms, in association with gleiosols. The humus content is medium in the upper horizon (1-2%) and very low in the immediately following sequences. This determines a small total humus reserve (below 60 t/ha). The total cation exchange capacity oscillates from low values (<10 me/100g

soil) in coarse-textured soils, to medium and high values (>25 me/100g soil) in fine-textured ones. The index that best expresses the specific stratification of alluvial soils is the sum of bases, very low in sandy soils (<5 me/100g soil) and high (18-35 me/100g soil) in clay ones. The reaction is weakly-moderately acidic in the upper horizon and weakly acidic in depth.

Fertility. Due to the high content of nutrients and favorable physical characteristics, as well as the existing excess moisture, alluvial soils have good to very good fertility. Under managed conditions, they have a favorable suitability for arable use (74 points - class III), pastures (85 points - class II) and hayfields (72 points - class III). Being easily irrigable, they are widely used for vegetable cultivation, for which they are found in the class IV of favorability (68 points).

VERTOSOL TYPE (VS)

Characterization. It is present on various landforms, from hills to low subsidence plains. It is divided into several subtypes depending on the excess water and the form of water that excessively affects the soils.

Among the predominant pedogenetic conditions, those relating to the parental material stand out, with fine and medium-fine granulometric compositions and mineralogical compositions in which expandable, smectic minerals excel. In the river and stream meadows, at the exit of the piedmont area, vertosols have evolved on medium-fine and fine fluvial deposits and under the influence of a high water table (0.5-3 m). In these cases, vertosols are found in various stages of gleyization.

On the terraces, Vertosols evolved on swelling clays. The low permeability gave the entire soil profile a weak internal drainage and evident stagnogleyization processes. The proportion of expandable minerals in the clay deposits of the meadows (fine fluvial deposits) varies around 60%.

Under this conditions , the locality Cenei's vertosols evolves in a multiannual average thermal and pluviometric extension of 9-11^{0}C, respectively 550-800 mm.

The grain size composition in the 0-20 cm horizon of Vertosols is medium-fine and fine. On the profile, the percentage of grain size fractions below 0.002 mm exceeds 45%.

The bulk density has medium values in areas with well-drained land and high values (1.5-1.6 g/cm^3) on arable, tamped and artificially compacted lands. The total porosity has medium values (47-50%), with the predominance of capillary pores which are occupied by water for most of the year.

In correlation with the high percentage value of the clay fraction, the humus content is reduced in the upper horizon, but this proportion is maintained over a large thickness, up to 100 cm, which gives vertosols a total humus reserve of over 200 t/ha.

Fertility Vertosol has an oscillating fertility, depending on the climatic conditions of the reference year. In conditions of excess rainfall, crops are compromised. The high water storage and retention capacity determines acceptable vegetation conditions in periods of moisture deficit. The same conditions of excess moisture lead to very low biological activity. In natural conditions, Vertosol has an average to low fertility (34 points - class VII), differentiated at the subtype level. In conditions of improvement (irrigation, drainage, organic fertilizers), they give very high yields. It is hard to work and with a high energy consumption. The optimal working period is very short.

GLEIOSOL TYPE (GS)

Characterization. Gleiosols were predominantly formed on non-carbonate or low carbonate fluvietil deposits, often layered, under relief conditions characterized by defective external drainage, under the influence of a high phreatic level.

Gleiosol appears in the low parts of the meadows, at the contact with the first terrace or at the contact between the dejection cones that parasitize the meadow and the longitudinal ridges. The essential

condition in the formation of these soils is that of groundwater, located at a depth that does not exceed 1.5 m, in which case a permanent excess of water is achieved.
The climatic conditions in which Gleiosol evolves vary widely, with average annual temperatures between 7°C and 100°C and average annual precipitation between 600-1000 mm.
The soils are moderately provided with humus and total nitrogen in the upper horizon, after which it decreases rapidly in depth. The humus reserve is medium (120-180 t/ha), higher in the mollic subtypes and lower in the cambic ones. The C:N ratio is around 15. The cation exchange capacity, the degree of base saturation and the reaction also vary depending on the nature of the fluvial deposit on which these soils were formed.
Fertility. Gleiosols have low fertility due to reduced microbiological activity. Under natural conditions they fall into the VII class of suitability for arable land (33 points). After total drying, the production capacity of these soils can be raised to the V class. They are generally used as pastures and hayfields, for which uses they are found in the IV class (with 64 points), respectively in the V class (with 58 points). To improve Gleiosoils, works are required to regulate water courses and deep drainage to lower and maintain the water table under control. This is associated with soil improvement works to improve the aerohydric regime, as well as periodic organic and chemical fertilization works.
In the context of preserving and increasing the fertility of agricultural lands, a detailed analysis of the limiting (restrictive) factors of agricultural production is imperative.
The purpose of this analysis is to provide the beneficiary, on the one hand, with a global picture of the phenomena and processes within the territory from which the general strategy or set of improvement measures can result, and on the other hand, to specify detailed solutions from different points in relation to the intensity of degradation and the characteristics of the land or the properties of the soil.
Compared to those mentioned, depending on the multitude of factors analyzed in the researched area, we encounter the following groups of restrictions and limitations:
Acidity is the result of a denazification process by substituting basic ions in the soil with hydrogen or aluminum ions of the same origin and/or from precipitation water.
In the studied area, it is a limiting factor on 37.03% of the surveyed area. In this sense, there are - low limitations due to acidity on 10.96% of the surveyed area, moderate limitations due to acidity on 26.07% of the surveyed area.
The humus reserve is a limiting factor on 79.88% of the surface. In this sense, within the territory we find: - lands with reduced limitations in surface area of 7.48%; - lands with moderate limitations in surface area of 60.29%; - lands with severe limitations in surface area of 11.10%; - lands with very severe limitations in surface area of 0.59%.
The CaCO3 content (danger of chlorosis) is found in the following situations: - lands with reduced limitations in the area of 3.40%; - lands with severe limitations on an area of 0.08%.
Surface erosion The following categories of limitations were encountered: - reduced limitations in the case of use as arable land in the area of 2.26%.
Excess groundwater moisture in the researched area the following limitations were encountered: - land with reduced limitations in the case of use as arable land on 1.36%; - land with moderate limitations in the surface area on 17.98%. Excess stagnant moisture - land with reduced limitations in the case of use as arable land on, 0.55%.
Floodability - land with very severe limitations when used as arable land on 21.31%.
The analysis of the results of agrochemical laboratory analyses in the form of weighted average values, as well as the inclusion within interpretation limits for each element analyzed.
Soil reaction (pH) - moderately acidic (5.01-5.80), respectively 39%; - weakly acidic (5.81-6.80), respectively 34.14%; -

neutral (6.81 – 7.20), respectively 2.69%; - weakly alkaline (7.21 – 8.40), respectively 24.19%. Phosphorus supply (ppm) - very weak (8 ppm), respectively 68.03%; - weak (8.1-18 ppm), respectively 15.40%; - medium (18-36 ppm, respectively 3.93%; - good (36-72 ppm), respectively 11.19%; - very good (72 ppm), respectively 1.44%. Potassium supply (ppm) - poor (66.0 ppm), respectively 6.38%; - medium (66.1 – 132.0 ppm), respectively 65.45%; - good (132.1 – 200.0 ppm), respectively 25.73%; - very good (200.00 ppm) respectively 2.45%. Humus supply (%) - poor (1.1-2.0%), respectively 25.29%; - medium (2.1 – 3.0%), respectively 17.80%; - good (3.1-4.0%), respectively 47.93%; - very good (4.1 %), respectively 8.98%. Nitrogen supply (%) It is expressed by the nitrogen index (NI) calculated according to the humus content and the degree of base saturation (V%). In this case we encounter the following situations: - weak (1.1 – 2.0%), respectively 65.94%; - medium (2.1 – 3.0%), respectively 34.06%.

CONCLUSIONS

The conclusions drawn from the field and laboratory research of soils allows the staking out of directions for the exploitation of agricultural lands in Cenei and facilitates the issuance of recommendations in order to restore, maintain or increase the productive potential of areas strongly restricted by a range of limiting natural factors.

- the natural setting of the researched area indicates an area with a high diversity of major relief forms (low terraces, plains, meadows), complicated by macro and micro-relief forms due to erosion or accumulation.
- following the activities of grouping agricultural lands in relation to their suitability for arable use, these were classified into the following classes:
    - class I, by 34.51%;
    - class II, by 11.95%;
    - class III, by 53.23%;
    - class IV, by 0.31%;

Their average sustainability extends over an area of approximately 70% - the numerous restrictions imposed by environmental and soil conditions for most categories of use and for the main agricultural crops make it indispensable to research the limiting and restrictive factors involved in conditioning production.

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