

LAND CHARACTERISATION FOR SUSTAINABLE USAGE IN LOCALITY CICLOVA ROMÂNĂ, CARAȘ-SEVERIN COUNTY

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ABSTRACT

Knowing the land resources under aspects concerning the productive capacity and technological features represents a primordial condition for a modern and efficient agriculture.

Earth, as production mean, totalizes what in the modern literature is defined as ecological condition, directly participates in the process of agricultural and forest production, as a “machine created by nature” and improved or degraded by humans. In the same time, earth represents the primordial condition of human existence, who cannot be conceived in earth absence, representing that so-called habitat space.

Geologically, formation of hills within this territory is connected to tectonic of the western part of the Western Carpatians which were subjected in Neogene to tectonic kneading and submergences, and also connected to evolution of the Pannonian Lake.

Nature and intensity of degradation synthetically presented as evaluation marks were analyzed for each limitative factor related to the expression manner in different points of the studied area and to particular requirements and ameliorative measures within the studied surfaces.

INTRODUCTION

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Geologically, formation of hills within this territory is related with tectonic of the western part of the Western Carpatians which were subjected in Neogene to tectonic kneading and submergences, and also connected to evolution of the Pannonian Lake.

There were identified within the territory –preluvosoil and luvisols formed under deciduous forest by low acid bioaccumulation processes. Many of these soils present podzolic processes because of partial leaching of clay and organic matter from layer A and their accumulation in the clayey-illuvial layer (Bt). As well, these soils are affected on versants by erosion processes. Another group of soils is represented by stagnosols, heavy soils, with strong accumulation of humus in conditions of humidity excess.

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MATERIAL AND METHODS

Soil samples were collected in field, in soil profile with natural arrangement, and analyzed in the laboratories of OSPA Timis and in laboratory of Pedology of the Faculty of Agriculture. There were used pedological and agrochemical wells, reagents, both in field and laboratory, Munsell atlas in colour system.

RESULTS AND DISCUSSION

Ciclova Română is located in south of Banat, on the south of Oravița town. the geographical coordinates are 21°42'21" eastern longitude and 45°00'34" northern latitude.

Geomorphologically, the territory of Ciclova Română is located in the transition area from Anina Mountains toward piedmont area, most of this territory belonging to Western Piedmonts, in Anina Piedmont.

Geomorphologically, three units have been delimited:

1. Hill area
2. Piedmont hill area
3. Meadow area (micro-meadow)

Formation of hills within this territory is strongly related with formation of Oravița Mountains (considered as extensions of these mountains).

Formation of Anina Mountains is related both with tectonic of the western parts of the Western Carpathians which were subjected in Neogene to tectonic kneading and submergences, and also connected to evolution of the Pannonian Lake.

The bed rocks are formed by hard rocks (dolomite, quartzite, schists) and by heavy dilluvial materials (carbonated or non-carbonated) in the hilly areas, and by heterogeneous, carbonated materials in meadows.

Thermal regime:

Annual mean temperature is 10°C.

Available data shows that annual mean precipitations reach the value of 736 mm.

Soils of Ciclova Româna are the result of interaction of all pedoclimatic factors, predominant being: bed rock, underground water, relief, climate, vegetation, human activity. The bioclimatic conditions characteristic to the researched area determine formation of soil toward low acid podzolic direction, by type preluvosols – constituting the bioclimatic type of soil for the studied area. The local specific conditions represented through variation of relief, bed rocks and water, determined deviations from the bioclimatic type of soil.

Such soils formed on bedrocks with fine and very fine texture, on plane or slightly inclined forms of relief, with low permeability, were subjected to water stagnation, resulted from precipitations, stopping or limiting its infiltration, which generated pseudo-gleyzation phenomena, more or less accentuated.

In areas with kneading relief, on versants more or less inclined, the surface water – also associated with faulty agrotechnic, erosion processes took place, phenomenon which is present in territory in all grades, resulting low to excessively eroded soils.

In the slightly inclined areas, in the inferior parts of versants, under water excess, were formed stagnosols, soils with high accumulation of humus. These are affected by surface erosion due to relief position.

In the low areas of the territory – in micro-meadows and micro-terraces, on carbonated deposits with fine textures, in water excess – due to higher underground water, were formed gleysols. Depending on depth of underground waters, these soils have or have not drainage features.

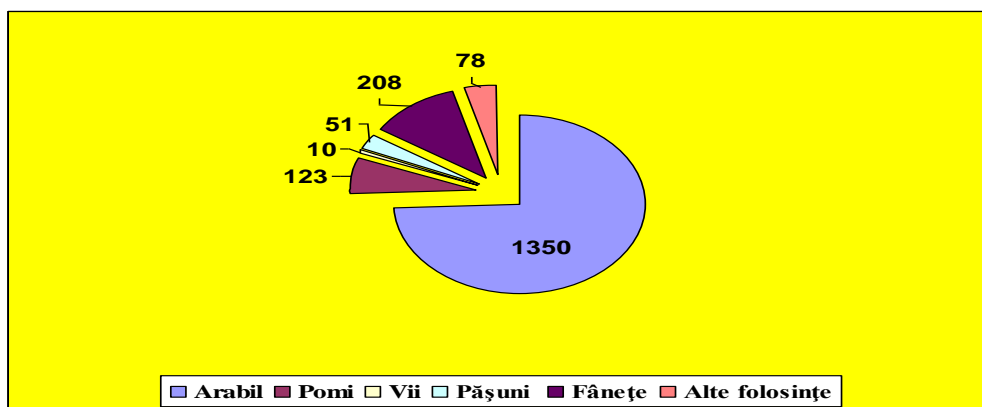


Figure 1 Land repartition in Ciclova Română after usage way (ha)

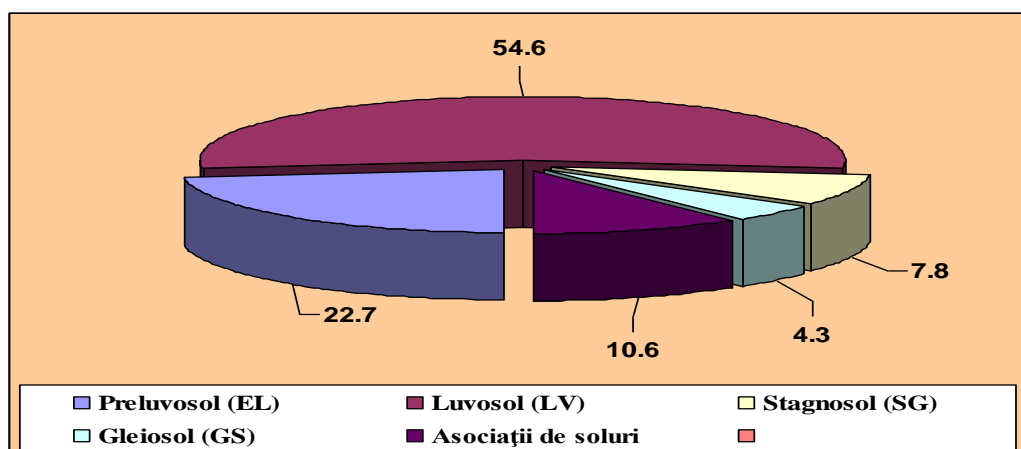


Figure 2 Land repartition by soil type in Ciclova Română (%)

Results show the followings:

- for stagnic luvisols – suitability and favourability for main usages and crops: Arable IV; Orchards IV; Vineyards VII; Pastures IV; Hayfields VI; Wheat IV; Maize V; Sun-flower IV; Potatoes V; Beet IV;

- for low eroded stagnic luvisols - suitability and favourability for main usages and crops: Arable VI; Orchards VII; Vineyards X; Pastures VI; Hayfields VI; Wheat VI; Maize VIII; Sun-flower VII; Potatoes VIII; Beet VIII.

- for strongly eroded stagnic luvisols- suitability and favourability for main usages and crops: Arable V; Orchards V; Vineyards IX; Pastures V; Hayfields V; Wheat V; Maize VII; Sun-flower VI; Potatoes VI; Beet V.

In context of conservation and increase of fertility of the agricultural lands, it is imperatively required a detailed analysis of the limitative (restrictive) factors of the agricultural productions. Analysis takes into account identification of degradations or limitations within the studied territory, the intensity degree, and also establishment of areas where these phenomena occur, in order to apply prevention measures or ameliorative workings.

Nature and intensity of degradation synthetically presented as evaluation marks were analyzed for each limitative factor related to the expression manner in different points of the studied area and to particular requirements and ameliorative measures within the studied surfaces.

The aim of this analysis is to provide beneficiary with a global image regarding the phenomena and processes within territory in order to find the general strategy or the assembly of improving measures, and on the other hand to particularize detailed solutions in different point related to intensity of degradation and land characteristics or soil features.

Analysis of limitative factors is useful for optimal usage of exploitation technologies and possible improving measures which will aim to remove the deficiencies appearing within the complex of hydro-ameliorative measures existing in the researched perimeter.

Related to the mentioned aspects, depending on multitude of analyzed factors, the following groups of restrictions and limitations can be distinguished:

A. Limitations due to chemical characteristics of soil:

Acidity is the result of process of bases loss, by substitution of basic ions of soil with hydrogen or aluminium ions with same provenience and/or from precipitation water (for H). Limitations are directly proportional with intensity of acidity.

Within researched perimeter the limitative factor comprises approx. 635,39 ha, 47,06% of researched surface.

Humus reserve represent food supply for plants and, in the same time, a constituent which influences the physical, chemical and biological properties of soils, thus highly determining the productive level of lands.

Soil content in humus, respectively organic matter, represents one of the defining characteristics of the fertility state. As fertility factor, humus acts as main food supply for plants, and especially as nitrogen reservoir. The more a soil is richer in humus, the more its quality is better and its productive potential is higher. Regarding the requirements of the most demanding plants concerning the humus reserve, these are: vegetables, hemp, beet, potato, sun-flower, alfalfa, clover, linen, maize etc. Depending on mentioned aspects and also on classification criteria of the indicator 144, the humus reserve is limitative factor for 326,84 ha, meaning 24,21% of surface.

Content of CaCO₃ (danger of chlorosis) is found in the following situations:

- land with low limitations, in surface by 150,32 ha, 11,13%;
- lands with severe limitations by 3,58 ha, 0,26%.

B. Limitations due to several physical features of soils

Gross texture. Within the researched perimeter there were identified the following categories of limitations due to gross texture of the arable layer. Due to gross texture there were found low limitations on a surface by 116,41 ha, 8,62%.

Fine texture. Soils with fine clayey and loam-clayey texture have a low permeability and a high capacity to retain water. Due to low permeability, water infiltration is slow, leaching is low and even at ordinary quantities of precipitations the soil rapidly reaches saturation level in the upper layer, and the rest of water stagnates at surface. When get wetting, clayey soils become very plastic and adherent, reason for why their tillage is difficult. In drought, these soils crack in polygonal lines due to high cohesion, opposing high resistance in ploughing. Although these soils are rich in humus and present high capacity to retain the other nutritive elements, plants cannot always find here optimal conditions of growing and development because of the antagonist regime of water and air. In this context, within the researched perimeter have been identified the following categories of limitations due to fine texture of the arable layer:

Due to fine texture were founded low limitations on a surface by 1232,54 ha, 91,29%.

Compactness represents the property of soil to oppose the forces which tend to mechanically separate the particles forming the soil. It is related to granular composition, water content, humus content, and adsorbed cation types.

Moderate limitations due to compactness were recorded on a surface by 478,82 ha, 35,46%. Severe limitations due to compactness were recorded on a surface by 324,46 ha, 24,03%.

C. Limitations due to water excess

Underground water excess. Depending on criteria specific to indicators 14 – gleysation and 39 level of underground water, within the researched perimeter were found the following limitations:

- lands with low limitations, in case of utilisation as arable land, on surface by 60,19 ha, 4,45%;
- lands with moderate limitations, on surface by 593,69 ha, 43,97%.

Excess of stagnant water. In reality cannot exist causes of excess of stagnant water, but rather circumstances which favour this phenomenon. Among these circumstances are mentioned: presence of clayey layer, lack of structure of layer A and presence in soil profile of the impermeable horizon Bt, relief, respectively presence of micro-depressions or existence of quasi-horizontal surfaces without lateral drains, indiscriminately usage of agricultural devices on land insufficiently "shrivelled".

Considering the up mentioned aspects, depending on relief, hydro-climatic balance, hydro-climatic index, permeability, stagnogleyzation degree, there were established classes of stagnant water excess within the researched perimeter, with the following limitations:

- lands with low limitations, in case of utilisation as arable land, on surface by 24,26 ha, 1,79%.

Flooding water. Depending on criteria specific to indicator 40, within the researched perimeter were found the following limitations:

- lands with very severe limitations, in case of utilisation as arable land, on surface by 441,14 ha, 32,67%.

D. Limitations due to processes of surface and depth erosion and landslides:

Land slope. Considering the land slope, there were found the following limitation categories:

- lands with low limitations, in case of utilisation as arable land, on surface by 586,28 ha, 43,42%;
- lands with moderate limitations, in case of utilisation as arable land, on surface by 311,84 ha, 23,09%;
- lands with severe limitations, in case of utilisation as arable land, on surface by 261,82 ha, 19,39%;
- lands with very severe limitations, in case of utilisation as arable land, on surface by 190,06 ha, 14,07%.

Surface erosion. Were found the following limitation categories: low limitations in case of utilisation as arable land, on surface by 109,73 ha, 8,12%.

CONCLUSIONS

Territory of Ciclova Română is geomorphologically enclosed in the transition area from Oravița Mountains to piedmont plain of sub-hilly glaciers. Geomorphologically, in the territory were delimited two units: area of hills and area of piedmont hills.

The bed rocks are formed by hard rocks (dolomite, quartzite, schists) and by heavy dilluvial materials (carbonated or non-carbonated) in the hilly areas, and by heterogeneous, carbonated materials in meadows.

Hydrographically, the territory belongs to Basin of Caraș River. The territory is crossed by the creek Valea Ciclovei (affluent of Caraș River), stream with permanent but very variable debit.

The underground water is located generally at depths larger than 10 m (even below 20 m in the hilly area) excepting several areas with low altitudes where it appears at 3-6 m.

Climatically, the territory of Ciclova Română, assessed by formula of KOPPEN C. f. b. x. , is a temperate continental climate. The annual mean temperature is 10⁰C and the annual medium quantity of precipitations is 736 mm.

Under vegetation aspect, the territory has forest vegetation –interference between beech and oak.

The most cultivated plants in area are: wheat, maize, oat, sun-flower.

Soils within territory of Ciclova Română were formed as result of interactions between pedoclimatic factors, preponderantly bed rock, vegetation, and human activity.

There were identified within the territory – preluvosoiluri and luvosoiluri formed under deciduous forest by low acid bioaccumulation processes. Many of these soils present podzolic processes because of partial leaching of clay and organic matter from layer A and their accumulation in the clayey-illuvial layer (Bt). As well, these soils are affected on versants by erosion processes. Another group of soils is represented by stagnosolurile, heavy soils, with strong accumulation of humus in conditions of humidity excess.

Assessment of agricultural lands has been made aiming to establish the production capacity of the land fund within territory of Ciclova Română.

Considering the suitability notes of each soil unit and the value of the averaged notes accorded in conformity with the current usage way, resulted the following classification:

- Arable class VI –a 49 points – Favourable I
- Orchards class VI-a – 42 points – Favourable I
- Vineyards class VII-a – 31 points – Favourable II
- Pastures class VII-a- 37 points – Favourable II
- Hayfields class VIII-a – 29 points – Favourable II

Considering the favourability of arable land for the main crops – the value of the averaged notes provides the following classification:

- Wheat class VI – 48 points Favourable I
- Maize class VII- 36 points Favourable II
- Sun-flower class VI – 45 points Favourable I
- Potatoes class VII – 33 points Favourable II
- Beet class VII – 37 points Favourable II

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