PEDOLOGICAL ASSESSMENT OF SOILS IN DROBETA TURNU SEVERIN, MEHEDINTI COUNTY, ROMANIA

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Abstract. *The grading of agricultural land is a complete operation of in-depth knowledge of the conditions for growing and developing plants and of determining the degree of favourability of these conditions for each use and cultivation. Agricultural production, and especially plant production, directly influenced by environmental factors and conditions in continuous stability, and to varying degrees of relation to man's intention and decision to change it, is a decisive factor in the economic development of society. Naturally, the manifestation of each climate attribute is determined by the geographical position of the place analysed, especially from a latitudinal point of view. These two elements determine, together with exposition, the ratio of the earth's surface to the sun and, implicitly, the way of receiving heat and, to a good extent, the manifestation of atmospheric precipitation. The geological and, last but not least, lithological complexity of our country's territory has made soils evolve on extremely varied rocks and parental materials, from ultra-basic to acidic rocks, from clays to sands, from rich and complex rocks, in geochemical aspect, to poor materials. Soil conditions, i.e., soil as a repository of vegetation, water, and food elements, represent a complex of attributes that act directly and indirectly on the growth and fruiting of plants. The potential and ecological capacity of an area of land to ensure plant development and yield is called fertility. Soil fertility, in accordance with climate factors, allows the reaching o agricultural parameters specific to each crop.*

Keywords*: Assessment, agricultural land evaluation notes, class fertility improvement.*

INTRODUCTION

The differences between soil and land are clearly highlighted if how they are classified is examined. Soil classification is a taxonomy based on the intrinsic characteristics of soils and reflects its important properties, considered a natural body or system. [ȘTEFAN V. ET AL., 2004].

Classification or, rather, groupings of soils have a pragmatic character determined by the aim pursued: suitability to working, suitability for different crops, suitability to irrigation, the need for desiccation – drainage, or corrosive action on underground cables, etc. [CANARACHE A., 1990, ȚĂRĂU D., 2003, BUCATĂ ET AL., 2003].

Land classification is, in fact, a grouping and also an evaluation of soils, including the environmental conditions in which they are found (i.e., pedo-topes), taking into account certain objectives, usually practical, comprehensive units (subgroups, groups, subclasses, classes) that differ from each other in terms of practical behaviour features (suitability) and efficiency of use for that purpose. [DUMA COPCEA ET AL., 2007, CASIANA MIHUȚ ET AL., 2018].

The classification of lands can be done in different ways, depending on the purpose or objective for which the grouping is made; having a more or less subjective prominent character, it is relatively more variable in time being subjected to much greater changes than the taxonomy of soils.

For this paper, the soils of Drobeta Turnu Severin were studied with the greatest spread, for different agricultural crops. Since land production capacity is influenced, in addition natural factors, by anthropogenic factors, land assessment must reflect this. In the case of landscaped and improved land, the bonus note for natural conditions will be multiplied using the bonus coefficients corresponding to the ameliorative works carried out.

In the present paper, five situations were taken into account including uses and different agricultural plants, fruit trees, and grapes: wheat, maize, sunflower, wine grapes, and table grapes. The aim of this work was to evaluate agricultural trends in Drobeta Turnu Severin, Mehedinti County, Romania.

The objectives pursued in the paper were: characterization of the natural framework, identification and characterisation of soil types and subtypes, calculation of bonus marks, determination of suitability, and classification of agricultural land in fertility classes. The methods used were determination of physical characteristics, determination of chemical characteristics, the bonus methodology developed by I.C.P.A. Bucharest. The results obtained are presented in detail for different categories of use or for groups of crops with the same biological or technological features. For each indicator, depending on its scale of use or culture, tables were made with the values of the respective coefficients.

MATERIAL AND METHODS

City and port at the Danube River, the municipality of Drobeta Turnu Severin is located in the depression of Topolnita and Severin. Drobeta Turnu Severin has a temperate-continental climate, in which sub-Mediterranean influences are felt. In winter, in particular, there are invasions of wet and warm air masses of Mediterranean and oceanic origin, which makes this season of the year milder. Summers are, generally, warm, sometimes with temperatures above 35°C, as a result of the invasion of tropical hot air.

The average annual air temperature is 11.5°C. The annual average rainfall is about 600 mm. The average wind speed is 6 m/s. Location and climate have made the waters of the Danube River calm, allowing the ships to winter, which caused the harbour and the modern city to appear. Increased soil fertility (increased humus and nutrient content, improved air and water diet, etc.) is possible through a rational farming system.

The main factor on which the actual fertility of the soil depends is the level achieved by science and technique and how they are applied in the agricultural production process. In cultivated ecosystems, crops are due to the cultural fertility (real, actual) of soil, climate factors and plants, plus the significant contribution of soil works, fertilizers, irrigation, etc. [K. I. LATO, ȘI COLAB., 2019].

In order to carry out this work, the soils with the greatest distribution around the town of Drobeta Turnu Severin, Mehedinti County, namely chernozem, cambic chernozem, and albic luvosol, were studied.

Chernozem

Chernozem is the most important soil due to the large areas it occupies and because of its natural fertility. The climate conditions in which these soils are formed are characterized by an average annual rainfall of 450 mm and by annual average temperatures of 11.4^{0}C.

The dominant features of the climate in the areas of formation of these soils are the rich rainfall during the spring, followed by prolonged drought and high temperatures in summer.

The natural vegetation under which the chernozems formed is made up of associations of well-established, high grasses with a rich and well-rooted root system. Among the most widespread grass associations are: *Festuca vallesiaca*, *Chrysopogon gryllus*, and *Agropyrum cristatum*. Along with grasses, some woody species are also found. Wood vegetation is represented by rare patches of *Prunus spinosa*, *Crataegus monogyna*, and *Rosa canina*.

The activity of the living phase of the soil and the increase in the number of populations are greatly stimulated by the large amount of organic matter that accumulates annually in the soil. [POPA M. ET AL., 2016]

From this point of view, this soil provides favourable conditions for intense activity. So, in these soils, there is a large number of populations namely centipedes, molluscs, nematodes, mites, beetles, ants, etc.

Therefore, all this plays an important role in the formation of the bioaccumulation horizon as well as in the entire evolution of the soil. [L. NITA ET AL., 2018, LUCIAN NITA ET AL., 2019].

Thus, the macro- and meso-fauna of the soil participate in the decomposition of plant debris, in their mixing with mineral matter; they contribute to the formation of a glomerular structure, and to the improvement of some physical properties of the soil. In these soils, due to optimal conditions of humidity, temperature, and reaction, the amount of organic matter also develops a rich bacterial flora of balance. Microorganisms carry out an intense activity of decomposition of organic debris and synthesis of humus substances. T

These soils were formed on very fine sands rich in calcium carbonate. Groundwater is generally found at great depths below 10 m: in this case the evolution of chernozems is automorphic. [OKROS A. ET AL., 2015, OKROS A. ET AL., 2018]

The superior quality of humus in chernozems is favoured by the presence of legume residues, which are rich in protein substances, under the influence of hydrolytic farms give rise to amino acids that participate in the process of synthesis of huminic acids.

Under the more active influence of some of the factors of soil genesis, chernozems undergo secondary changing processes or, in some cases, salinization processes, gleization leading to the separation of different subtypes of chernozems. [NIȚĂ LUCIAN-DUMITRU, 2007]

Cambic chernozem

The natural vegetation under which the cambic chernozems formed is made up of associations of grasses with both woody species and grassy associations. Wood vegetation is represented by rare patches of *Prunus spinosa*, *Crataegus monogyna*, and *Rosa canina*.

The activity of the living phase of the soil and the increase in the number of populations are greatly stimulated by the large amount of organic matter that accumulates annually in the soil.

From this point of view, this soil provides favourable conditions for intense activity.

There fore, in these soils, a large number of populations is noted, namely centipedes, molluscs, nematodes, mites, beetles, ants, etc. All this plays an important role both in the formation of the bioaccumulation horizon and in the entire evolution of the soil.

Thus, the macro- and meso-fauna of the soil participate in the decomposition of plant debris, their mixing with mineral matter, contributing equally to the formation of a glomerular structure, and to the improvement of some physical properties of the soil. In these soils, due to the optimal conditions of humidity, temperature, and reaction, the amount of organic matter, a rich bacterial flora of equilibrium develops.

Microorganisms carry out an intense activity of decomposition of organic debris and synthesis of humus substances.

These soils formed on very fine sands, rich in calcium carbonate. Groundwater is generally found at great depths, below 10 m, in this case the evolution of chernozems being automorphic.

The superior quality of humus in cambic chernozems is favoured by the presence of legume residues, which are rich in protein substances, under the influence of hydrolytic ferments, give rise to amino acids that participate in the process of synthesis of huminic acids.

Another aspect is that legumes enter symbiosis with certain nitrogen-fixing bacteria, thus enriching the humus in this element.

Due to climatic and vegetative conditions, the claying process is more evident, showing an increasing intensity.

Albic luvosol

The natural vegetation under which luvosol was formed is made up of oak-beech forests represented by species such as *Quercus petraea* and *Fagus sylvatica*. The grassy vegetation beneath these forests is acidophilic. Luvosol formed on acidic rocks.

All these parental rocks underlying the formation of this soil are poor in calcium, nutrients, and even ferro-manganic minerals.

The decomposition of organic matter in this soil is produced by fungi, resulting in a smaller amount of humus which is dominated by fulvic acids. [OKROS A. ET AL., 2014]

RESULTS AND DISCUSSIONS

In order to assess the production capacity of the studied land in Drobeta Turnu Severin, Mehedinti County (soil types and subtypes), 17 indicators among the most significant and specifically determinant from the whole set of environmental conditions were chosen.

The results obtained are presented in detail for different categories of use or for groups of crops with the same biological or technological characteristics.

Table 1

Soil assessment in Drobeta Turnu Severin, Mehedinti County, for wheat, grain maize and sunflower

Soil type	Wheat		Grain maize		Sunflower	
	Grade	Fertility class	Grade	Fertility class	Grade	Fertility class
Chernozem	90	II	90	II	90	II
Cambic chernozem	82	II	82	II	82	II
Albic luvosol	70	IV	72	III	72	III

Chernozem got, for wheat, barley, grain maize, and sunflower crops grades of 90, falling within the second fertility class, and for the rye, grade 82, second fertility class.

Cambic chernozem falls into the third fertility class with grade 73 for barley, and for wheat, rye, grain maize, and sunflower, it falls in the second fertility class with grade 82.

Albic luvosol, for wheat, barley, and rye, got grade 70, specific to the fourth fertility class, and for grain maize and sunflower, grade 72, specific to the third fertility class.

Table 2

Assessing soils in Drobeta Turnu Severin, Mehedinti County, for wine grapes and table grapes

Soil type	Wine grapes		Table grapes	
	Grade	Fertility class	Grade	Fertility class
Chernozem	90	II	90	II
Cambic chernozem	80	III	80	III
Albic luvosol	23	VIII	23	VIII

For wine grapes and table grapes, chernozem got grade 90, second fertility class.

Cambic chernozem got, for both grape crops, grade 80, second fertility class.

Albic luvosol got grade 23, eighth fertility class for both cultures.

CONCLUSIONS

The results obtained are presented in detail for different categories of use or for groups of crops with the same biological or technological features. For each indicator, depending on its scale of use or culture, tables were made with the values of the respective coefficients.

The main factor on which the actual fertility of the soil depends is the level achieved by science and technique and how they are applied in the agricultural production process. In cultivated ecosystems, crops are due to the cultural fertility (real, actual) of soil, climate factors and plants, plus the significant contribution of soil works, fertilizers, irrigation.

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