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## AGRICULTURAL POTENTIAL OF CHERNOZEMS NEAR THE IRON AND STEEL INTEGRATED WORKS OF GALATI IN THE PERIMETER OF THE TERRITORIAL ADMINISTRATIVE UNIT OF SENDRENI, GALATI COUNTY

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### Abstract

In view of the massive deforestation carried out since the 18th century, in order to use the land for agricultural purposes in conjunction with a number of ecopedological factors (friable geological substrate, intensification of the torrential nature of precipitation, etc.) and the anthropic factors (the unreasonable use of the slopes, erroneous application of agro-technical methods, etc.), the agricultural areas overlap with soil units with various physico-chemical properties depending on the intensity of pressure exerted by the mentioned factors. Under these conditions, the present paper aims to evaluate the edaphic resources of the chernozems in terms of agricultural potential in the Şendreni commune, Galati County, Romania. The studied area is pedoclimatically located in the micro-zone characterized by a warm-dry climate and a slightly rugged relief, where chernozems with typical, limestone and cambic subtypes have been identified, having medium textures (loam, sandy loam) and medium-fine (clay loam), with various structures ranging from grain to small and medium subangular polyhedrons, or even devoid of structure, in relation to the granulometric composition and the agrotechnical works performed. The cartographed chernozems show imbalances in the concentrations of the main macroelements. Research has shown that, in conjunction with local ecopedological factors, for each category of land use, these soils have very low to severe limitations on their use for agricultural purposes, with the observation that, by applying ameliorative measures such as works to prevent and combat accelerated soil erosion, ameliorative fertilization works, irrigation works, there is the prospect of obtaining high yields and satisfying from a nutritional point of view.

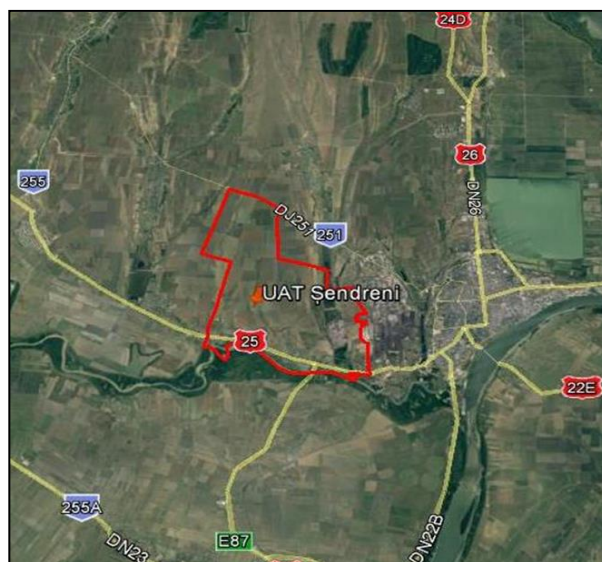
**Keywords:** Chernozems, accelerated erosion, soil quality and productivity, Galati County, Romania.

## 1. INTRODUCTION

Considering the conjugated action of the natural and anthropic factors, which through the exerted pressure generated the modification of the terrestrial surface and, implicitly, of the soils and of the corresponding vegetal associations, but also of the crops, the present paper aims to evaluate the

edaphic potential of the chernozems, the most widespread soil types from the territory under investigation.

The research was carried out on the administrative territory of Sendreni, Galati county, located at 12 km from Galati, between 45°29'55" N and 27°52'42" E (the northern limit) and 45°24'20 "N and 27°55'14 "E (southern limit). In the north, it borders the Schela and Smardan territories, in the south of Vădeni commune, Braila county, to the east with the administrative-territorial unit Galați, and to the west with the Branistea commune (Fig.1).



*Fig. 1. Position of the administrative unit of Sendreni in Galati County (processed after [11])*

The importance of knowing the edificial potential of the soil in a territory lies in the fact that the need for food is growing in the last decades, the soil being constantly subject to the challenges of increasing production. In most cases, by practicing an intensive agriculture, without applying the agrotechnical means adequate to the physico-chemical properties of the soil, without respecting the optimal requirements of each cultivated plant, and all the more, without reference to the geographical conditions, the result obtained might be one contrary to expectations.

It is well known that soil is an important component of the environment, which plays a particularly important role in maintaining a balance in the terrestrial ecosystem, a renewable resource, but an exhaustible one under intense exploitation conditions. In other words, the assessment of soil edaphical potential can be seen both from the point of view of their use for agricultural purposes and from the point of view of preserving the quality of the environment [9].

## 2. MATERIALS AND METHODS

The research was carried out on surfaces with different land use categories for agriculture, the soils being subject to the pressure caused by the cultivation of the land combined with the local physico-geographical conditions (relief, geological constituents, climate, vegetation associations, hydrographic network and groundwater).

The soils were mapped according to the legislation in force for the implementation of The National Soil Monitoring System for Agriculture (Order of the Ministry of Agriculture and Rural Development no. 278/2011) [10], methodology elaborated by the National Research and Development Institute for Soil Science, Agrochemistry and Environmental Protection Bucharest, Romania, for soil survey (1986) [7] and The Romanian Soil Taxonomy System (2012) [4]. The soil samples were conditioned and analyzed in the laboratory of The County Office of Pedological and Agrochemical

Studies of Galati (C.O.P.A.S. Galati), respecting the protocols stipulated in the methodology mentioned above [2].

The following soil parameters were determined: humus content, nitrogen, phosphorus and potassium concentration, in the mobile form, to determine the level of soil nutrient supply in the 0-20 cm layer. Also, the soil reaction was determined, as it is directly involved in soil retention and migration of micro and macroelements involved in plant nutrition. For a good data accuracy, these were correlated with local physico-geographical conditions.

On the basis of the ecopedological indicators, the land classification marks for the arable, pasture, vineyard and orchard use were calculated, giving penalty coefficients from 0 to 1, depending on the restriction of each indicator used in the calculation for the main crops, fruit trees, vine and pasture [3],[7],[8].

### 3. RESULTS AND DISCUSSION

The analytical data have shown that the identified chernozems present imbalances in the supply of nutrients relative to reference ranges, due to inappropriate agricultural practices used in the past decades. The situation of the main parameters of the investigated soil is shown in the charts below (Figs. 2-5 – data processed after [2]).

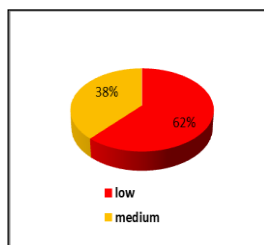


Fig. 2. The rate of chernozems supply with humus

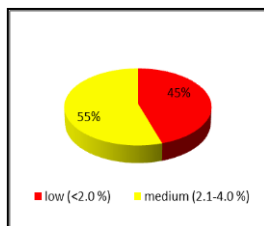


Fig. 3. The rate of chernozems supply with nitrogen (according to nitrogen index %)

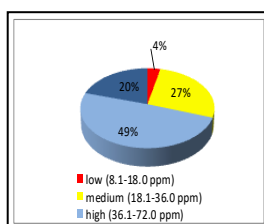


Fig. 4. The rate of chernozems supply with mobile phosphorus

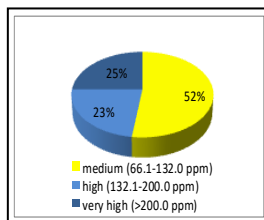


Fig. 5. The rate of chernozems supply with mobile potassium

The soils pH varies from neutral to slightly alkaline, generally ranging from the optimum required by crop plants, fruit trees and vines.

Research has shown that soils exhibit different degrees of surface erosion, predominantly slightly affected by water erosion [4], given the fact that most of the studied territory is located on nearly level, quasi-nearly level surfaces or very gently sloping (< 5.0 % [3], [7]). Moderately and heavily eroded soils are spread especially on slopes that are within the range of 5.1-25.0% (gently

sloping to moderately sloping [3]), specific to the ones that flank the main valleys. In these conditions, proper management of the dynamics of the slopes should be considered, so that in the long term the soils will not be completely exhausted, the fertile horizons being very difficult to restore.

The status of the mean quality classes, according to the evaluation land marks in natural conditions, in the areas overlapping the chernozems, by land use categories is presented in Table 1.

*Table 1. The chernozems areas mean quality classes, in natural conditions (data processed after [2] using the scale of interpretation provided by [1])*

Arable		Pasture		Vineyard		Orchard	
Class	Significance of the limitations	Class	Significance of the limitations	Class	Significance of the limitations	Class	Significance of the limitations
III	moderate	III	moderate	IV	severe	II	weak

The site studied is characterized by a quality class with moderate restrictions for arable and pasture use, requiring improvement measures. For the orchard, the land has a medium quality class with low limitations, with difficulties that may arise from the perspective of the prevention of degradation processes, and for the vineyards the restrictions are severe and the land can be used for this purpose only after the limitations have been corrected.

Researches by Ene et al. (2010 [5]) revealed that heavy metal concentrations in the 0-5 cm soil layer increase with proximity to the source of pollution, thus for some elements the alert threshold for land sensitive uses was exceeded. Under these conditions, the quality of the soils may decrease with one class and plant production may lessening by reference to the production that can be obtained under unpolluted soil.

#### 4. CONCLUSIONS

Chernozems with typical, limestone and cambic subtypes and having medium (loam, sandy loam) and medium-fine (clay loam) texture, occupy the largest area of Sendreni territory, Galati county. The results of the research show that soils require improvement works to correct the limitations, improve reserves of macronutrients for plants growth, stabilize soil particles, which, due to their low humus content, in the context of deforestation and spontaneous flora removal [6], and lack of screen of trees, are susceptible to surface erosion. The main land improvement works to be considered are anti-erosion works, landscaping with irrigation systems, radical fertilization, the creation of screens of trees [5], [7].

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