EVALUATION OF NATURAL AND ANTHROPICALLY INDUCED CONDITIONS FOR THE DEFINITION OF SOIL PRODUCTIVITY FROM THE COVURLUI PLAIN

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Soil – a complex biodynamic system - and its thorough research allow us to know and direct its most important properties in order to improve both qualitatively and quantitatively the whole agricultural production and of soil fertility, too. In order to ensure the best crop conditions necessary to the cultivated plants it is compulsory to relate plant research with environmental factors, as well.

This paper has as major objectives the delimitation, the inventory and evaluation of soil resources, the delimitation and inventory of the limitative or restrictive factors in land ise , as well as the production levels estimation for agricultural lands expressed in terms of estimation records.

This paper presents several aspects concerning soil resources in the Branistea Village area, located on the Covurlui Plain.

Appeared under various natural conditions, all the soils in the area differ very much both in quality and fertility, in their production capacities as well. That's the reason why soil and land resource quality determination and appreciation have a great importance. The Covurlui Plain, as an important geographical area, presents a great variety and variability of environmental factors which ultimately influence the conditions in which plants grow and thrive. Therefore, an ecopedological research is compulsory if we want to achieve a modern agriculture.

Plant production requires a perfect knowledge of their productive and technological characteristics and of the unfavourable factors that inhibit production.

All these studies concerning soil evaluation have emphasized a series of limitative factors which negatively influence the production capacity of these soils in the given area.

From 4,948 ha, some surfaces are degraded by various factors: surface erosion, land slides, nutrient deficiency, secondary compactness, deficient hydro-thermal sources.

All these limitative or restrictive elements that affect the productive potential of soils may be altered through pedo-hydro-meliorative actions as well as new measures for degraded soil conservation and protection.

We may conclude that knowing the factors that either improve or diminish the production capacities of each area represents an efficient

decision-taking instrument in choosing the right measures for land administration.

***Keywords**: conservation,factors, fertility, limitativ,restrictiv,soil resources.*

The necessity to use the land rationally for various human activities and of land, in particular, for food supply in accordance with the requirements of sustainable development and environmental protection have determined the introduction of a complex system of technical, economical and juridical recording of all natural resources.

It is necessary to achieve a data base concerning the quality of agricultural lands which should allow an optimum administration.

Starting from all these, the authors try to present in the paper some aspects concerning the morphological, physico-chemical and biological changes, with a view to their present and future productivity , generated by the frequent anthropic interventions.

MATERIAL AND METHOD

This paper has as major objectives the delimitation, the inventory and evaluation of soil resources, the delimitation and inventory of the limitative or restrictive factors in land ise, as well as the production levels estimation for agricultural lands expressed in terms of estimation records.

The researches have been done in accordance with the Romanian System of Soil Taxonomy (SRTS -2003) and Pedological Study Elaboration Methodology by ICPA in 1987. Soil characterization has been made after their intrinsic traces, mostly morphological , inherited or as a result of pedogenesis processes , using the horizons and the diagnosis properties which have been measured and identified in the field.

The whole analysis was based on a land expanse of about 4,869 ha of agricultural lands situated on the communal territory of Branistea Village, Galati County.

RESULTS AND DISCUSSIONS

Territorial characterization

Through its geographical position , the territory under study belongs to the Covurlui Plain (its northern part) and to the Lower Siret Plain (its southern part).

The Covurlui Plain looks like a tabular plain of river-lake origin , covered with loessoid deposits. The present relief was born on Neogene formations and it is represented by long peaks separated by valleys.

The following morphological units can be identified:

- *interriver plateaux* that cover the highest parts of the territory, placed at altitudes smaller than 70 m, on a North-South orientation with loessoid deposits on which ovoid saucers have been formed .

- *the slopes* make the connection between interrivers and valleys, occupying large surfaces , with various inclinations. they are moderately inclined and they are affected by moderate and strong surface erosion , plus slidings, too. Due to these

phenomena, large slope surfaces are partially or totally bare, on which ravines are formed.

- *the valleys* are narrow and full of water only because of rainfalls, have a consistent character that points to their young age.

The territory of Branistea village belongs to the Siret hydrographic basin, from which the most important is the Lozova Rivulet.

Because of the alluviation process in the Siret Meadow , at the confluence Of the Lozova with the Siret River a river liman was formed , called the Lozova Liman, with a surface of about 250 ha. Chemically speaking, the Siret water is good for irrigations.

The depth of the phreatic water is between 1-1.5 m in depressions and 2-3 m at sand bank level.

Branistea has a continental temperate climate with dry summers and harsh , frosty winters .The annual average temperature is 10.5˚ c, the annual average rainfalls are 426 mm. The dryness index Em de Martonne is 24, which is quite good for plant growing.

Branistea belongs to the steppe vegetal formation. The steppe flora is represented by root grasses or by those present in the cultivated plants.

In the Siret Meadow there are also holm willow and poplar.

Anthropic Influence

Under man's influence, the soil has suffered substantial changes becoming a product of man's work and doing. The man, through his direct activity (agricultural processing, cleaning actions for new plantations and other social – economic buildings, then pesticide, fertilizer and amendment administration, culture rotation and administration) or indirect : modification of outer pedogenetic factors (climate, vegetation and water) , all these have intervened in the development of the natural pedogenesis processes.

Man is also responsible for the accelerated erosion of soils on the slopes through the excessive expansion of agricultural works to the detriment of the protective natural vegetal layer.

Soils and Natural Conditions

The diversity of the morphological forms generated a diversity of microclimatic and pedological conditions , under permanent changes, both under the influence of natural factors and antropic ones. Linked with this diversity, the Branistea territory may be divided into 21 soil groups subdivided into three classes:

1. *Chernisol* class with chernozem soil type and subtypes: *typical chernozem and cambic chernozem.*

2. *Protisol* class with alluvisol soil type , subtypes: *mollic, gley and salinic*.

3. *Antrosol* class with types: *erodosol and antrosol*

Soil Characterization on the Branistea Territory

Typical Chernozems (Cz Ti)

They have a uniform spreading area over the Branistea territory on smooth land or slightly uneven units, with various degrees of erosion and these soils

occupy about 1,529 ha (31 %).Typical chernozems have an Am-AC-C profile with well expressed horizons.

The texture is undifferentiated, average (sometimes fine or coarse, depending on the parental material), the glomerulate structure , well developed in the Am horizon and medium in AC, its porosity and aerohydrical regimes- quite good. The humus content is bigger (3-6 %) and of higher quality (calcic mull), with small quantities of potassium.

The degree of base saturation (V%) is about 90 % , the pH is between 7-7.6, with increased microbiological activity and favorable nutrient absorbtion good for plant growth.

Therefore, to obtain big crops, it is necessary to irrigate, to rationally fertilize and to prepare the soil at the optimum moment. They cultivate wheat, corn and sunflower here.

Cambic Chernozems (CZ cb)

These soils are found on horizontal or slightly fragmented lands, on smooth or slightly inclined areas, on terraces or small hills. They are soils formed on loess or on loessoid deposits under the influence of the continental climate. They occupy 641 ha (12.94 %).

They were formed like typical chernozems , but leaching and alteration are more pregnant, which led to the separation of a characteristic cambic horizon Bv.

The soil presents an Am-Bv-C or Cca profile .The Am horizon is dark (dark brown, blackish) and has a 20-40 cm in depth; Bv is 30-60 cm in depth, also dark in color, while C or Cca starts from 80-120 cm in depth.

This profile presents biogene neoformations and CaCo3, the last only at the level of horizon C or Cca. The texture id medium (sometimes it is fine or coarse, function of the parental material), undifferentiated on profiles; well developed glomerulate structure in Am and prismatic columnoid in BV; very good porosity, permeability and aerohydrical regime. The soils are rich in superior humus (3.5 % calcic mull), high degree of base saturation (V) ≈80 %, pH≤ 7, microbiologically active and good nutrient absorbtion.

They have average humus quantities , weak in phosphorous content, good in potassium content and with a weak acid to weak alkaline reaction.

Organic and mineral fertilizers are strongly recommended.

Alluviosols

Alluviosols occupy 2,442 ha in Branistea, representing 49.36 %.

They belong to the Protisol class (SRTS -2003) and they are defined by the presence of a horizon A(Ao), followed by the parental material represented by river, lake and river-lake deposits with various textures. As subtypes we have here: calcaric, mollic, gley and salinic alluviosols.

They are well-supplied with water, although humus accumulation is limited, but rapid. Nutrient absorbtion depends on texture and humus content. They are generally base-saturated soils and their fertility is given by the nature and intensity of bioaccumulation processes. They may be cultivated at Branistea territory with : corn, sugar beet, whaet, barley, sunflower, potatoes, vegetables and fodder plants.

Erodosols (ER)

This soil category is characterized by an intensely truncated profile through erosion or human induced uncovering , so that the horizons left defy classification and inclusion. Erodosols have various profiles, due to their origin or to the intensity of erosion or uncovering processes , so that we have here erodosols with A/C-Cca profile. In Branistea erodosols occupy 176 ha (3.56 %).

These soils have a clayey texture , they are strongly affected by erosion, to be found in the fourth class of availability for the arable. They are also with low productivity or even totally unproductive and they are mostly pastures.

Antrosols (AT)

Antrosols have an antropedogenetic horizon (a hortic A or an antracvic association horizon marked with aq) with a minimum thickness of 50 cm. These soils occupy here in Branistea about 156 ha (3.16 %) and they are occupied with vineyards.They present a worked out layer of 50 cm which was made up of the mixture of several horizons, so that the soil natural profile is destroyed.

As a result, these soils have got a porosity and a better permeability and they also become more active microbiologically. They are not so well supplied with nutrients and they have an alkaline to neuter reaction.

Classification of Soils in Classes of Quality

As a result of this evaluation and estimation activity , a series of limitative factors have been emphasized factors which influence the production capacity of agricultural lands , and so dividing the area under analysis in four classes of quality, as follows:

- class I comprises 2,063 ha, representing 42.3 5 of the total surface;
- class II includes 2,506 ha, representing 51.4 % of the surface, where the danger of soil degradation can be avoided by simple pedoameliorative actions;
- class III, with a surface of 203 ha (4.2 %) comprises moderate erosion-ridden lands (e_{12}) and weak (e_{11}), as well as sandy soils;
- class IV has a surface of about 176 ha (3.6 %) and includes strongly affected soils (e13) and extremely strong affectation of lands (e_{14}) by hydric erosion.

Among the restrictive factors we may include a lacking hydric resource and the surplus thermal one.

As a result of the excessive exploitation of arable lands , the degree of compactness and destruction of structural aggregates determines the appearance of the phenomenon of dusting. Moreover, due to the deficit of rainfalls which is accentuated in the last years, the excessive dryness led to the pasture vegetation scorching.

The most serious problems are given by the aggressiveness of the anthropic factor upon these lands.

By knowing all the limitative or restrictive elements that affect the production potential of the soil layers, we can perform useful pedohydroameliorative measures in order to improve the quality of the land.

CONCLUSIONS

1. The physico-geographical conditions of the area under analysis determined the formation of soils with various qualities.

2. The use of these soils is in accordance with the nature of all pedoclimatic conditions, although the way they use lands is not always the most appropriate for a really sustainable administration.

3. In spite of an apparently-good natural ecological potential , the general situation of the soils in the area under analysis is still unsatisfactory because most soils are being affected by one or more limitative or restrictive factors.

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