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THE SOIL COVER ARANCA PLAIN IN RELATION WITH THE ENVIRONMETAL AND ANTHROPIC FACTORS

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Abstract*: The studied territory has a single unit of relief, the plain, in the form of a large alluvial area of subsidence and ramble, which are many abandoned stream beds, representing the old courses of the river Aranca and of its tributaries. The influence and action in time of the pedogenetic factors (relief, rock, climate, hydrology), as well as the human intervention through the important hydroameliorative works that started more than two hundred years ago, determined the existence of a soil cover with a sharp complexity and diversity. Low plains covered with fluivio-lake deposits represent the lowest sector from the area of Banat. Are relatively recent, drained by several rivers with permanent regime. The low slope and local or general subsidences have determined cover of loessoide deposits and of the older alluviums with the recent alluviums or with very fine-textured deposits. By the XVIII century, the rivers had not firmly fixed riverbeds, and the plain served as an intense area of marsh, punctuated by rare banks. After contact with the cone of scattering river Bega River and River, has been developed a discontinuous soil broadband of the salt sodic class. In this paper we aim at presenting a panorama of the soil cover in the Aranca Plain, its yielding potential, fertility limiting factors, and the main problems arisen by the valorising of the soil resources in the area we studied. The area under study is located in the hydrographic basin of the Aranca River, i.e. in the Aranca drainage-drying system, overlapping the old parasitic watercourses of the Mures River, that were frequently flooded before the building of the dams, making the area a true divagation, strongly alluvial one. A main characteristic of the soil cover is the dynamics differentiated in time and space that results from natural conditions of formation and evolution. As a result of pedo-genetic processes there appeared a cover of mosaic-like soil, which is also seen in the main soil types identified in the area under study.*

Key words: *soil, soil cover, chernozem, clime, hydrography, Aranca plain, anthropic.*

INTRODUCTION

Low plains covered with fluivio-lake deposits represent the lowest sector from the area of Banat. Are relatively recent, drained by several rivers with permanent regime. The low slope and local or general subsidences have determined cover of loessoide deposits and of the older alluviums with the recent alluviums or with very fine-textured deposits.

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MATERIAL AND METHODS

In this paper we aim at presenting a panorama of the soil cover in the Aranca Plain, its yielding potential, fertility limiting factors, and the main problems arisen by the valorising of the soil resources in the area we studied.

Interpreting data, characterising the natural frame, analysing fertility limiting factors, as well as upraising agricultural lands were carried out according to the "Methodology of Soil

Study Development" (vol. I, II, and III) and to the "Romanian System of Soil Taxonomy" developed by the I.C.P.A. Bucharest in 2003.

RESULTS AND DISCUSSIONS

The Ancara plain.

The formation and evolution of the Ancara plain can be attributed to two factors. One of them can be Paleomureşul sent twoards the south, on the current path of the stream Aranca, one of its side arms. The fact is explained by less extensive sandy deposits and relatively thin, which have been identified and described on the one hand and on the other of its course and also for some sandy lenses above the plain area in the south and which can be attributable to the same agent.

The second factor, which can be considered as dominant, is about the existence of water and marshy areas, which FR. GRISELINI (1779) [70] [98] and others contemporary observers like (CL. VON MERCY -1725, E. VON FRIEDBERG - 1853) had presented it in a graphic or descriptive form, with more extensive areas in a down altitude perimeter (77-80 m) where the slope is about zero. Ramble waters of the rivers regularly feed the marshy areas, moment when materials sorting occurs in quiet, basic, with sediments deposit with very fine granulometric particle size and where the mineralogical composition is predominat. In the opens from the Valcani, Dudeştii-Vechi,Cheglevici, the percentage of clay (particle size fractionbelow 0.002 mm) frequently exceeded the 80% of the total volume of the rock. The subsidence has lowered the whole package of the original rocks (loessuri, old alluvium, etc.), has helped cover with the same clay deposits of the existing soils. Only hard and in deep openings can be traced the old paths of Paleomureşului whose sediments appear fragmented only on surface (northeast of Sânnicolaul Mare).

In the initial stage, the Paleomureşului leaving from the narrow place to south was done through an old loessic soil, that has deeply eroded into north and has parasite it with fluviatile deposits in the south, certified by the presence of loessic witnesses highest on the right and left of the current course of the stream Aranca.The presence in the existing river beds of the streams Aranci, Galaţca, Ciucoşin is subsequent these being fixed on the directions of the old river beds of Paleomureşului. The supply of the three small courses is effectued from the ground waters bounded from the minor riverbed Mures, their sources being close from a few hundred meters (Aranca) to the actual course of the Mures. After a first stage of observations we do not consider plausible the idea of a old course or effluent of the Paleomureşului on the current route of the stream Mureşan. In the areas of its influence have not been observed any sedimentation differences neither in surface or in descriptions of up to 2 m depth, the detailed section wich was studied during soil mapping.

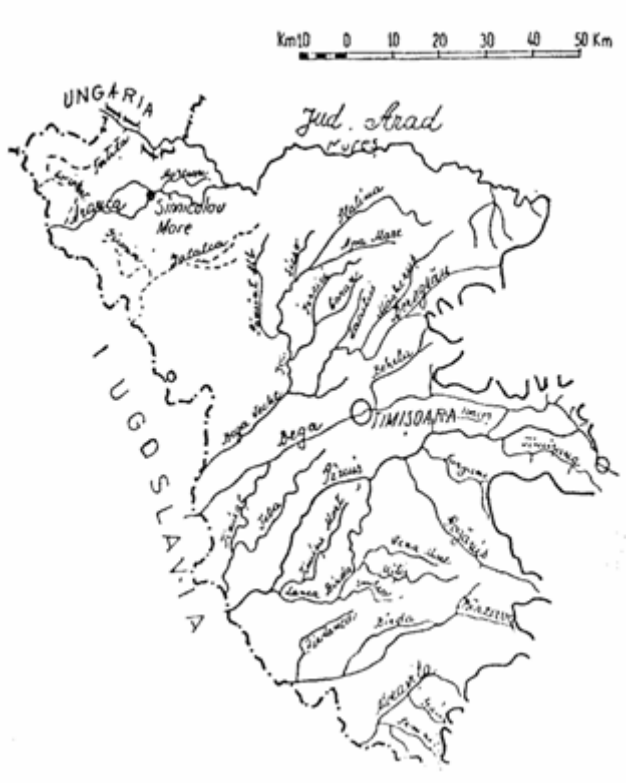
Morphological, the relief is represented by a series of depressions formed by subsidence of the structure, after natural maturation of clay deposits. On this background the loessoides plateaus, sandy banks and parasite riverbeds print a moderate unevenness of relief. In contact with loessoidic plains appear the same soil area, rich in salt, but with a smaller extension.

Geology

The plain is about half of the Banat Plain area and represents the lowest stage of morphological with hipsometrc values between 75 and 200 m.

The training of the deposit of sedimentary rocks and soils cuverture are related about the existence of Pannonian lacustrine area and of the surrounding regions that rises above sea level.The main element of the internal dynamic in the evolution of the Banat Plain is the subsidence, which started in Pontian, continued until the end of Pliocene, actualy present in current small but discernible limits.

General or local the subsidence has favored appreciable accumulation of heterogeneous material, alohtone or local and has prevented in part the evolution of soils that were regularly covered by new deposits. The trend of permanent raising of the alluvial bed has caused mainly in the low plain meandre, ramb, breakups. Shore erosion has led to a permanent imbalance of the slopes, lateral migration and the lenght increasing of the hydrographic network.



Clime

The plain is about half from the Aranca surface is on the lowest morphological step, with hipsometric values between 75 and 120 m.

The training of the sedimentary rocks deposit and of the soils couverture are related with the existence of the Pannonian lacustrine area and of its surrounding regions . The main element of the internal dynamic in evolution of the Aranca Plain is the subsidence, which started in Pontian, continued until the end of Pliocene, present at this time in small but discernible limits. General or local subsidence has favored appreciable accumulation of the heterogeneous foreign materials or local and has prevented in part the evolution of soils that were regularly covered by new deposits. The raising trend in alluvial bed, mainly in the low plain has led to meandre, ramb, breakups of the rivers. The shore erosion has led to a permanent imbalance of the slopes, lateral migration and the increaseing of the river network length.

Hidrography

The transport of water from the land surface (transit or local rivers) acting on the pedogenetic processes and soil changes only in the areas with strict influence (very rarely flood

plains founded in low plains), especially that the most rivers in the Banat Plain in their lower sector, are reclaimed from the sea.

The network of the Banat plain rivers belongs to Danube catchment. (Fig. 1). The only and most important local bourn is Aranca. With a length of 108 km, Aranca has superimposed his bourn over an old river bed during the holocene Mures. Drains an area of 1016 km2 with a network of small valleys which are very close to the bed of Mures. Because of low slope of the basin, under 3m/km, the drainage of surface water is very low, which gives to the area an obvious nature ramble.

Vegetation

The Banat plain is characterized by a low diversity of physical and geographical conditions, caused by the presence of a monotonous landscape. The climate, built on a temperate continental fund with Mediterranean influences, evident, especially in connection with the relief, a handful of local microclimates, with obvious implications for disposal of soil and vegetation.

The human activity, as attested by centuries in the studied territory, exerted a profound influence on ecological conditions, so that the current state of the soils and vegetation is the result of interaction between natural and anthropogenic factors. Therefore, the natural processes have been conducted for the enhance of pedogenesis fertility and the natural vegetation was fragmented, weakened as expansion under the pressure of agricultural soil needs, being replaced by growing plants.

Natural flora elements have different geographic origins: European, Eurasian, Circumpolar, Boreal, Arctic, Alpine, Balkan, Mediterranean, Illyrian, plus many endemism. All these are climatic zoned and diversed based on intrinsic soils characteristics. The ecological research of plants highlighted the interdependence between climate, soil and vegetation.

The reflectability principle of the pedogenetic conditions on the cover vegetation is the main theory of the indicator species, that stenonic species (with low organic valence for a given factor or group of factors) can be used as indicator species for a given value of these factors. The indicator species are related to a particular biotope in which the considered factor is very limited, analytically delayed. In the intensively cultivated areas the indicator species are in a small number being represented in particular by weeds.

Soils

The area under study is located in the hydrographic basin of the Aranca River, i.e. in the Aranca drainage-drying system, overlapping the old parasitic watercourses of the Mures River, that were frequently flooded before the building of the dams, making the area a true divagation, strongly alluvial one.

A main characteristic of the soil cover is the dynamics differentiated in time and space that results from natural conditions of formation and evolution.

As a result of pedo-genetic processes there appeared a cover of mosaic-like soil, which is also seen in the main soil types identified in the area under study (Table 1).

The typical chernozem differs from the other soils in the Banat area by several chemical features, which confer it a high fertility potential. In this context we should mention the following physical and chemical features:

- neuter to alkaline soil reaction with pH values oscillating between 7.92 (A țel. K) and 8.46 (Cca.ac);
- high humus content with values between 3.38 and 2.92%;
- good supply with mobile phosphorus whose values oscillate between 71 and 72 ppm;
- clayey texture all along the soil profile.

Vertic chernozem has only a few restrictions:

- the presence of vertic phenomena in horizons A/By and Bcy, i.e. 49-125 cm deep in the soil;
- medium clayey-argyllous texture;
- medium values of the mobile phosphorus content (4.87 ppm).

Table 1.

Main soil types in the Aranca Plain

Nr.	Class	*Type*	Area (ha)	% of the studied area	Average assessment grade
1.	*Protisoils*	*Aluviosoil*	*3.505*	*22.49*	*64*
2.		*Entiantroposoil*	*151*	*0.97*	*72*
3.	*Cernisoils*	*Chernozem*	*2.658*	*17.06*	*90*
4.		*Faeoziom*	*772*	*4.95*	*81*
5.	*Cambisoils*	*Eutricambosoil*	*283*	*1.82*	*79*
6.	*Pelisoils*	*Vertosoil*	*6.313*	*40.50*	*62*
7.	*Hydrisoils*	*Gleyosoil*	*1.471*	*9.43*	*45*
8.	*Salsodisoils*	*Solonets*	*433*	*2.78*	*36*

Weakly salinised vertosoil. The presence of soluble salts at small depth, i.e. between 26 and 68 cm, results in salinisation processes materialised in high values of soluble salts, between 200.4 (AykGosc-ac) and 225.4 mg/100 g of soil (Cyksc).

If on the surface the values of pH are slightly acid (pH = 5.89), deep in the soil they are moderately alkaline (pH = 8.76).

The clayey-argyllous texture as well as the presence of gleysation at small depth (26-50 cm) diminishes considerably fertility potential of this type of soil.

Typical gleyosoil, mesogleyic, very strongly gleyied, bati-hypo-stagnic, with weak sodising below 100 cm, bati-calcareous, medium argyllous clay/medium argyllous clay, developed on fluviatile material medium fine non-carbonate.

Physical features:

- fine texture along the profile;
- low total porosity;
- low permeability;
- very low air porosity.

Chemical features:

- slightly acid soil reaction between 0-21 cm, neuter between 21-37 cm, and slightly alkaline for the rest:
- very high humus supply in the first 50 cm;
- depth alkalinising (moderate below 100 cm).

Slightly alkalinised solonets.

The presence of soluble salts at low depth resulted in the appearance of salinising phenomena that limit soil

- fertility and crop assortment. It is characterised by the following chemical features:
- high values of the pH, between 9.76 (Aţel) and 10.16 (Btna sc k);
- high content of soluble salts oscillating from 165.17 (Aţel) up to 241.40 mg/100 g of soil (Btna sc k);

- clayey to argyllous clayey texture at the basis of the soil profile;
- low humus content, with values oscillating from 2.19 (A țel) up to 0.42% (Btna sc k).

CONCLUSIONS

As a result of our study of the Aranca River Plain, we can draw the following conclusions concerning the natural frame of formation and evolution of this area:

1. morphologically, the relief is represented by a succession of depressions formed by constitution subsidence after physical maturation of argyllous deposits;
2. the area studied is located in the hydrographical basin of the Aranca River, i.e. in the Aranca River drainage system;
3. vegetation in the studied area is located at the interference of the Danube steppe area, the ante-steppe sub-area, with the sylvo-steppe sub-area.

In the context of conserving and improving agricultural land fertility it is necessary to analyse in detail the limiting (restricting) factors of soil

fertility in this area:

4. salinisation and alkalinisation processes diminish considerably crop yields on lands covered by solonets and other strongly salinised soils;
5. gleysation and stagno-gleysation is very strong on hydro-soils;
6. the level of phreatic waters as well as watercourses did not suffer from the essential changes in the soil in time. In this area it is not impossible to face soil.

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