STUDII CU PRIVIRE LA ÎNVELIŞUL DE SOLURI DIN CÂMPIA TORONTAL

STUDIES ON SOIL COVERS IN THE TORONTAL PLAIN (WESTERN ROMANIA)

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Abstract: ***The territory we studied, the Torontal Plane, has a single relief unit, plain, which in its turn is made up of a low plain with Aeolian deposits, a low plain with alluvial-proluvial deposits, a low plain with fluvial-lacustrian deposits, and the Mureş Flooded Plain. The influence and action in time of soil and climate factors (relief, rock, climate, hydrology) as well as human intervention through major hydro-ameliorative works started well two hundreds of years ago resulted in a soil cover of extreme complexity and diversity.***

Rezumat*: Teritoriul studiat, Câmpia Torontalului, prezintă o singură unitate de relief, cea de câmpie, care la rândul ei este formată din câmpie joasă cu depozite eoliene, câmpia joasă cu depozite aluvio-proluviale, câmpia joasă cu depozite fluvio-lacustre şi Lunca Mureşului.Influenţa şi acţiunea în timp a factorilor pedogenetici (relief, rocă, climă, hidrologie), ca şi intervenţia omului prin importantele lucrări hidroameliorative, începute cu mai bine de două sute de ani în urmă au determinat existenţa unei înveliş de soluri cu o accentuată complexitate şi diversitate.*

Key words: *Torontal Plain, soil cover, study*
Cuvinte cheie: *Câmpia Torontalului, studiu învelişului de sol*

INTODUCTION

This paper aims at presenting a global image of the soil cover of the Torontal Plain, its productive potential, fertility limiting factors, and the main problems arisen by the valorisation of soil resources of the studied territory.

MATERIALS AND METHOD

Data processing, characterising the natural frame, analysing fertility limiting factors, as well as assessing agricultural lands have been done in accordance with the ***Metodologia Elaborării Studiilor Pedologice*** (vol. I, II, and III) and of the ***Sistemul Român de Taxonomie a Solurilor*** developed by the I.C.P.A. Bucureşti in 2003.

RESULTS AND DISCUSSION

Natural frame of development and evolution

A. Low plain with Aeolian deposits

1. *The Jimbolia – Bulgăruş Plain*. Through its uniformity and expansion of the plains, the Jimbolia – Bulgăruş has the features of a low tubular plain. The main features of this plain is the homogeneity of its loessoid deposits (2-3 m thick).

Loessoid deposits are remodelled by water courses and have no fossil soil interstitial. They have medium and medium fine granulometric structures. The plane plains are spotted by circular deposits in the south-east side and prolonged ones along the old divagating branches of the Mureş River, in north-west. The general phreatic level is between 2 and 3 m.

2. *The Sânnicolau Plain* is separated from the Jimbolia Plain by the sandy Galaţca-Giucoşin Plain. It is less expanded and is bordered north by the Aranca Plain, south by the Periam line, west by Pesac, north by Tomnatec, and east by Nerău, after which it rises to north-

west to south Sânnicolau Mare.

Isolated, the loessic plain is interrupted by sandy dunes, result of the escapes before Sânnicolau Mare of some branches of the Mureş River (that used to flow along the present road of the Arcana rivulet) toward south.

3. *The Beba – Cherestur Plain* is little expanded in Romania, and it continues to north-west, in Hungary, and then to south-west, to Serbia.

The plain is covered mostly by loessoid deposits interrupted by gross fluvial or fine fluvial-lacustrian interstitial. To the east, loess is covered by fluvial-lacustrian deposits in ever thicker layers, thus gradually passing to the Aranca Plain.

The soil cover resembles to that of the Jimbolia and Sânnicolau Mare sectors, where predominate carbonate chernozems with a stronger gelling degree.

B. The low plain with alluvial-proluvial deposits

The low plain with alluvial-proluvial deposits of the Mureş; *the sandy plain of Teremia – Pesac.* The sandy plain territory of Teremia – Pesac starts in the northern part, at the contact point with the Mureş Flooded Plain, through a very narrow plain section, after which it widens toward south – south-west, taking the shape of a micro-delta continuing beyond the border, in Serbia. At the east, the plain follows the contour Periam – Pesac – Lovrin – Gottlob – Comloşu Mare, which separates it from the Jimbolia Plain. It is separated from the fluvial-lacustrian Aranca Plain by the Teremia Mare – north Tomnatic – west Periam line.

C. The low plain with fluvial-lacustrian deposits

The Aranca Plain. The development and evolution of the Aranca Plain can be explained by two factors. One of them is the Paleomureş that sent toward south, along the present road of the Aranca Rivulet, one of its secondary branches. This is sustained by the sandy deposits little expanded and relatively thin that were identified in descriptions on both sides of its course and by some sandy lentils that overrun the perimeter of the southern plain and that can be explained by the action of the same agent.

The second factor that can be considered as dominating is related to the existence of some aquatic and marshy domains, areas much expanded in a low perimeter (77-80 m) and with almost no slope at all.

Morphologically, the relief is represented by a succession of depressions formed by the constitution subsistence as a result of the physical maturation of the loamy deposits. On this fund, the loessoid plateaus, the sandy dunes, and the parasitic plains give the relief its moderate unevenness. At the contact with loessoid plains there occur the same areas of halomorphous soils, but les expanded.

The main characteristic of the soil cover is its differentiated dynamics in time and space as a result of natural conditions of development and evolution.

As a result of soil and climate processes, there appeared a mosaic-like soil cover which is sustained by the main soil types identified in the studied area (Table 1).

Morphological, physical, and chemical features of the main soils in the Torontal Plain

Typical chernozem differs from the other soils in the Banat area by several chemical features, which confer it a high fertility potențial. In this context we should mention the 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.

Table 1

Main soil types and associations in the Torontal Plain

No.	Class	Type	Area (ha)	% of the studied area
1.	*Protisoils*	*Aluviosoil*	9564	7.94
2.		*Entianthroposoil*	190	0.16
3.		*Psamosoil*	2713	2.25
4.	*Chernisoils*	*Chernozem*	59528	49.41
5.		*Phaeoziom*	614	0.5
6.	*Cambisoils*	*Eutricambosoil*	3278	2.72
7.	*Pelisoils*	*Vertosoil*	21368	17.77
8.	*Hydrisoils*	*Gleyosoil*	2455	2.03
9.	*Salsodisoils*	*Solonetz*	1109	0.92
10.	*Soil associations*		19645	16.3
TOTAL			120464	100

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).

Weakly salinised vertosoil. The presence of soluble salts at small depth, i.e. between 260 and 68 cm, results in salinisation processes materialised in high values of soluble salts, between 200.4 (AykGosc-ac) and 225.4 mg/l 00 g of soil (Cyksc).

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

The clayey-argyllous texture as well as the presence of gleysation at small depth (26-50cm) 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 result 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 (Aţei) 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 se k);
- clayey to argyllous clayey texture at the basis of the soil profile;
- low humus content, with values oscillating from 2.19 (A ţel) up to 0.42% (Btna sc k).

CONCLUSIONS

As a result of our study of the Torontal Plain, we can draw the fol. conclusions concerning the natural frame of formation and evolution of this area:

-morphologically, the relief is represented by a succession of depressions formed by constitution subsidence after physical maturation of argyllous deposits;

- the area studied is located in the hydrographical basin of the Aranca River, i.e. in the Aranca River drainage system;

-vegetation in the studied area is located at the interference of the Danube 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:

- salinisation and alkalinisation processes diminish considerably crop yield on lands covered by solonets and other strongly salinised soils;

- gleysation and stagno-gleysation is very strong on hydro-soils;

- the level of phreatic waters as well as watercourses did not suffer from essential changes in the soil in time.

In this area it is not impossible to focal developments while

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