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REGARDIN TABULAR SOILS FROM ROMANIA

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Abstract

Presently, in the category of sandy soils we find those soils that in the control section (2 m) present a coarse and/or a middle coarse texture, hence those that contain less than 12% sand under 0.002 mm and a small quantity of organic matter.
In Romania, the sandy soils cover a surface of over 439.000 ha, out of which 272.000 ha are of Aeolian nature, grouped in 18 perimeters.
In the case of the tabular soils, one can notice the presence, into their profile, of some shallow layers (frequently of 1-8 cm in thickness) of finer material, in which the clay under 0.002 mm appears a little bit increased (2-7%) compared to the interlayer.
The layers-interlayers sequence is specific only to the soils formed on Aeolian sandy sediments.

Key words: *tabular soils, sandy sediments, layers, interlayers.*

INTRODUCTION

These kinds of soils appear in our country only on sands of Aeolian origin and are represented only by some subdivisions of the eutricambosoil, preluviosoil and luvosoil types (SRTS, 2012).

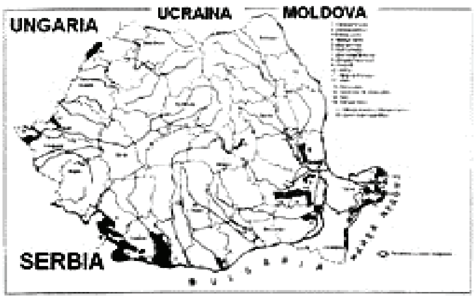

Figure 1. The map of sandy soils occurrence in Romania (scale 1:3,500,000)

As it is known, in the category of sandy soils one can find those soils that represent at least on a thickness of 50 cm (but usually on more than 2 m) a coarse texture (sandy or sandy clay, having less than 12% clay 0.002 mm) and a small/medium content of humus (0.6-1.5%).

In Romania, these kinds of soils can be found in many geographical regions, but on larger surfaces they appear in the Western Plain, the Plain of Oltenia, Baragan Plain, Buzau-Siret Plain, Coast-Deltaic Plain and Brasov Depression, grouped into 18 perimeters totalizing 272,000 ha (Figure 1).

MATERIALS AND METHODS

The identification of the tabular soils was done based on the pedological mapping on medium-scale (1:25,000; 1:50,000) according to the pedological studies elaboration methodology of the National Institute of Research and Development for Pedology, Agro-chemistry and Environment Protection of the Academy of Agrarian and Sylvain Sciences from Romania. Thus, more than 5000 soil profiles have been opened, on depths of 1.0 to 2.5 m, out of which 5 to 10 samples have been taken from the genetic horizons and, respectively, from the layers and interlayers, on depths of 20 cm at most and 3 cm at least. These samples have undergone physical and chemical analyses (grading, pH, humus, base saturation value, N, P, K, etc.).

Laboratory results have been interpreted according to the above mentioned ICPA methodology.

RESULTS AND DISCUSSIONS

Regarding the tabular soils, we have to keep in mind the fact that these are to be found only in some of the abovementioned regions, such as Carei Plain, Blahnitei Plain, Romanati Plain, Tecuci Plain and Negru River Depression. A thing that can be noticed in the case of these soils is the presence in the profile of some thin layers (frequently of 1-8 cm) of fine material, in which under 0.002 mm fraction appears slightly raised compared with the interlayers by 2-7% (Table 1, Figure 2).

Table 1. Physical and chemical data regarding the Date tabular preluvosoils (Blahnita Plain)

Horizon	Depth in cm	Granulometric composition			
		0.002 mm	0.002-0.02 mm	0.02-0.2 mm	0.2-2.0 mm
Ap	0-15	6.2	6.9	36.5	50.4
Ao	20-55	7.6	7.3	34.0	51.1
AB	50-65	6.0	7.6	34.2	52.2
Bt	85-100	5.6	7.4	34.0	53.0
	110-116	14.4	7.6	30.6	47.4
	120-130	9.7	6.4	31.8	52.1
	142-147	12.3	5.4	26.1	56.2
	150-170	5.3	4.0	24.9	65.8
	200-205	6.0	1.3	33.8	58.9
	215-220	12.4	1.0	30.4	58.2

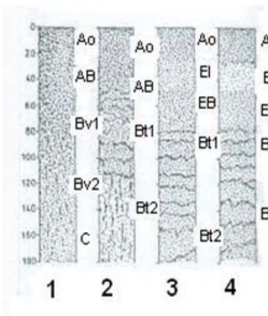

Figure 2. The thin strip of fine material on the profile of soils types 1. Eutric cambisols; 2. Lamellic luvisols; 3. Lammellic luvisols; 4. Albic luvisols

The content of dust and fine sand in these soils present a continuous decrease within the Bt horizon, but with a layer-interlayer association it remains constant: the coarse sand increases continually with depth and, as opposed to dust and fine sand, it presents 4-9% variations within layer-interlayer association, decreasing within layer.

This distribution of dust, fine sand and coarse sand fraction on the profile within a layer-interlayer association points out the lithological discontinuities in soil material at different depths.

Given the conditions of an exclusively illuvial process within the layer-interlayer association considered homogeneous under the granulometric aspect, the illuvial process should change only the percentage content of different granulometric fractions by concentration or dilution, but not their proportion. The existence of nf-ng different proportions within the same layer-interlayer association pleads for the different granulometric nature of the respective material

Secondly, the lithological discontinuities existent within the soil material at different depths as well as within a layer-interlayer association, the multilevel evolution of the soil and the variation of the alteration process intensity on profile prove the fact that the genesis of such a Bt horizon is complex.

The morphological study of the land pleads rather for the sedimentogene character of the layer-interlayer sequence; the layers reach the most reduced dimensions and they distance themselves between the positive limits of the Aeolian relief, namely advancing to the apex of the dunes, while in the case on interdunes they become thicker and thicker and come closely together becoming on single horizon up to 30-40 cm.

In another area from the country (Motru Piedmont, Ohaba-Pestenuta perimeter), under the conditions of a hilly relief having altitudes up to 350 m, on dacian sands and under durmast forest (*Quercus petraea),* we have identified both typical luvosoils and whitish luvosoils, but without noticing any layer-interlayer sequence. Within the granulometric composition of the luvosoils prevails the sand: the coarse one represents 21 to 23%, and the fine one not more than 45%. The clay content presents a slight decrease on the profile, from 6-7% in the superior horizon (Ao) to over 21% in Bt (Table 2).

Table 2. Physical and chemical data regarding the typical tabular luvosoils (Motru Piedmont)

Horizon	Depth in cm	Granulometric composition			
		2.0-0.2 mm	0.2-0.02 mm	0.02-0.002 mm	0.002 mm
At	0-5	23.2	43.9	26.5	6.4
Ao	10-25	23.1	42.3	27.9	6.7
El	25-37	21.6	43.9	27.1	7.4
EB	37-50	21.6	43.6	25.6	12.6
Bt1	70-90	21.3	44.6	12.6	21.5
Bt2	125-145	22.0	43.9	16.1	18.0

From the abovementioned we can notice the fact that the layer-interlayer sequence is specific only to the soils formed on the sandy sediments of Aeolian nature and this happens when (for example, in the Romanati Plain) the frequency of the wind from the western sector (north-western) is three times bigger (64%) than that of the wind from the eastern sector; the currents from the western sector dominate the whole year: January – 64%, April – 63%, July – 70% and October – 63%.

The persistent action of the wind has created sand dunes in the entire Oltenia Plain. Ordinarily, in this region, mainly in the Blahnita and Romanati Plain, the wind speed is big (11 m/s) more than 60 days (68) per year.

The air movement under the form of wind has a special influence mainly on the geographical landscape. Through its action of erosion, transport and accretion it creates forms of Aeolian relief – dunes – that continuously advance in the direction of the wind, excavations, tree uprootals, but also a specific microrelief of „ripple marks" (Figures 3, 4, 5, and 6) that eventually could, very well, explain the layer-interlayer sequence characteristic of the tabular soils.

Figure 3. Deflation processes (S Ciuperceni)

Figure 4. Aeolian excavation (Sud Smârdan)

Figure 5. Aeolian erosion at the west of Desa (trees uprootal)

Figure 6. Aeolian erosion at the west of Desa

The air-mass interferes with the overflow surface, so that it carries up in the atmosphere appreciable quantities of fine material that are deposited within the lines of the ripple marks microrelief after the phenomenon ends. Both the number and depth of the layers, the formation of the tabular soils depend on their gravity, duration and the repeatability of the phenomenon.

CONCLUSIONS

Tabular soils (with Bt horizon in layers) formed on Aeolian sands appear in Romania only in some of the 18 perimeters. The laboratory analyses have confirmed the genesis of such a horizon, while the morphological study pleads rather on the sedimentogene character of the layer-interlayer sequence.

In forming the layer-interlayer association, an important role was played by the climate, through the wind regime (direction, speed, frequency). Through its action, the wind creates not only a rippled relief of dunes-interdunes, but also a specific „ripple marks" type microrelief, in whose lines the finest materials from the atmosphere are deposited after the wind suddenly stops. The process presents a certain repeatability, a thing that leads to the sedimentogene sequence on layers-interlayers.

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