

PELLIC VERTISOLS AND VERTISOLS IN TIMIȘ COUNTY

PELOSOLURI ȘI VERTOSOLURI ÎN JUDEȚUL TIMIȘ

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Abstract: In accordance with the new Romanian Taxonomy Soil System, there are two types of soil in the soil class Pellisol: Pellosol and Vertisol. Both of them are deep clayey soils (>45% and >30% clay) but in the Vertisol dominated clay minerals such as smectites, that expand upon wetting and shrink upon drying. Deep wide cracks form when the soil dries out and swelling in the wet season, but in the Vertisol these phenomena are generalized and the slickensides have 10-60° inclination. The correlation with WRB-SR and USDA-ST is very difficult and also is the separation in the soil survey between Pellic Vertisols and Vertisols in Timiș County.

Rezumat: Noul SRTS a introdus la nivel de clasă – Pelisolurile, cu două tipuri de sol – Pelosol și Vertosol. Ambele tipuri sunt soluri extrem argiloase, cu peste 30% argilă, iar Pelosolul frecvent peste 45% în primii 100 cm. Natura mineralogică smectitică a argilei favorizează umflarea prin umezire și contracția prin uscare. Crăpăturile largi sunt prezente la ambele soluri, dar numai la Vertosol structura sferoidală cu suprafețe de lustruire și unghiuri de 10-60° față de orizontală este dominantă. Corelarea cu WRB și USDA este dificilă ca și identificarea și separarea celor două tipuri în cartarea pedologică.

Key words: pellic, vertic, clay, shrinkage, swelling

Cuvinte cheie: pelic, vertic, argilă, contracție, gonflare

INTRODUCTION

Vertisols are deep clayey soils (>30% clay) and Pelosol are also (>45% clay), dominated by clay minerals such as smectites, that expand upon wetting and shrink upon drying. Vertisols form wide cracks from the soil surface down to at least 50 cm depth when drying out. Deep wide cracks form when the soil dries out and creates polished and grooved ped surfaces (slickensides) or wedge – shaped or parallel – sided aggregates in the subsurface vertic horizon (Soils Atlas, 2005). The landscapes of a Vertisol may have a complex micro-topography of micro-knolls and micro-basins called “gilgai”. Gilgai is a consequence of churning of soil material as a result of swelling and shrinking. The nature of Vertisols is conditioned by the parent material. They are mainly derived from fine grained rocks, such as basalt, tuff, basic metamorphic rocks, limestone, and marl and from fluvial, lacustrine or marine alluvium. The topsoils are characterized by a well – formed granular structure. The most obvious features of Vertisols are the angular blocky parallelepiped structures in the subsoil with slickensides and wedge-shaped aggregates. Where heaving is pronounced some erosion may be observed on the mounds and within the mounds evidence of upward movement may be seen, suggesting that in time the whole soil turns over. In the W.R.B. Major Reference Group there is only Vertisol, with another 23 Reference Group. As soil types for Vertisol on regional map there are: Calcari-chromic Vertisol; Chromic Vertisol; Eutric Vertisol; Gleyic Vertisol; Calcic Vertisol; Pellic Vertisol; Calcari-Pellic Vertisol; Gleyi-vertic Vertisol.

For region Banat, the Soil Maps of Europe (1:500000) identifies as Vertisol types: Vpg-Vertisol gleyi-vertic in area of Valcani – Beba – Cheglevici – Dudeștii Vechi and in area of Foeni – Giulvăz – Uivar; Vp – Vertisol pellic in the zone of Gătaia – Jamu Mare and Grădinari – Oravița – Vrani. Unlike WRB-SR, the SRTS – 2003 introduces a new type of soil

– Pelosol, assumed from the Referentiel pedologique (1992) which has Pelosols, with a structure horizon, S, distinguishable from horizon above and the parent material below by a change in colour or structure, and vertic horizon, V., with Vs – surface horizon and Vv – typic horizon. Horizon Sp – pellosol, contains >45% clay and presents a prismatic structure or angular blocky structure. As the soils dry, deep cracking occurs from the surface but there not oblique shear planes which can be observed only at Vertisols. Pellosols can be: typic, brunic and differentiated.

In the Romanian Soil Taxonomy System (SRTS) there are two types of soils Pelosol and Vertosol defined similar with WRB for Vertisols and with Referentiel pedologique for Pelosol.

MATERIAL AND METHOD

The paper relied on the soil survey effectuated by OSPA Timișoara during the year 1967-2006th. It has been used 290 soil profiles from Cenad (77 profiles), Beba Veche (50 profiles), Dudeștii Vechi (89 profiles), Sânnicolau Mare (74 profiles) in order to establish the soil characteristics profile features, properties and for realize the identification of Vertosol and Pelosol. It will be present some soil profiles in order to make the difference between Vertosols and Pelosols in Timiș County.

RESULTS AND DISCUSSION

The analysis of the soil survey studies allow us to separate Vertisols of Pelosols and the analytical data are given in Table1, the results are average of 50 profiles in the territory of Beba Veche (VS – 13 profiles, PE – 3 profiles), Cenad with 77 profiles (VS – 3 profiles, PE – 9 profiles), Dudeștii Vechi with 89 profiles (VS – 20 profiles, Pelosol – 6 profiles) and Sânnicolau – Mare with 74 profiles (VS – 2 profiles, Pelosol – 5 profiles).

Table 1

The average of clay and CEC parameters

Territory	Vertosol		Pelosol	
	Clay %	CEC me	Clay %	CEC me
Beba Veche	62.95	43.56	56.37	31.98
Cenad	59.37	48.31	53.71	32.63
Dudeștii Vechi	62.71	42.28	43.01	29.69
Sânnicolau Mare	62.00	49.83	57.26	30.53
Average	61.76	46.00	52.59	31.20

The higher values of clay (61.76%) are on Vertosols and the CEC's values can be explained by the mineralogical nature of clay dominated by smectites. Pelosols are also clayey but the CEC is only 31.20 me (greater than 30 me proposed by French Referentiel)

Vertosol gleyc – Cheglevici (Gleyi – pellic Vertosols)

Profile description

0-20 cm, Ap, ploughed layer, black clay with subangular blocky structure

20-54 cm, Ay, vertic horizon, black clay with angular blocky structure

54-78 cm, By, vertic horizon, very dark grey clay with coarse prismatic structure and slickensides

78-140 cm, ByCsc-ac, vertic horizon, grey clay with prismatic structure and slickensides

140-180 cm, CGrK, gleyic properties and calcic horizon with massive structure

Table 2

Analytical data

	Ap	Ay	By	ByCsc-ac	CGr
pH	6.50	7.30	8.20	8.00	8.30
clay	75.6	75.7	76.6	74.1	43.0
CEC	54.6	65.2	60.2	59.6	45.6

Planosol gleic – stagnic – Giulvăz (Verti - Gleyic Cambisol)

Profile description

0-23 cm, Ao, ochric horizon, silty clay, very dark grey with small angular blocky structure

23-36 cm, AB, ochric horizon, silty clay, very dark grey with angular blocky structure

36-63 cm, Bz₁w horizon, silty clay loam with great blocky structure, cracks of 2-3 cm

63-90 cm, Bz₂Gr horizon, loamy clay, massive structure, cracks of 1-3cm, gleyic properties

90-118 cm, Bz₃Gr horizon, medium clay, massive structure, rare cracks, gleyic properties

118-145 cm, CkGr horizon, silty clay, dark grey, gleyic properties

Table 3

Analytical data

	Ao	AB	Bz ₁ w	Bz ₂ Gr	Bz ₃ Gr	C _k Gr
pH	5.98	6.19	6.45	7.72	8.54	9.16
clay, %	43.8	52.0	49.1	47.9	35.9	27.3
CEC, me	32.86	28.79	29.92	27.13	23.25	19.8

Most of the soil profiles considered previously as Vertisols in Timiș County must be included now at Pelosols, because they don't achieve the necessary conditions for Vertisols. The situation is valid especially for the area of Găția Plain and for the area between Foeni – Giulvăz – Uivar.

CONCLUSIONS

Vertisols are deep clayey soils dominated by smectites, with a typical vertic structure, slickensides or wedge – shaped aggregates with shiny surfaces and oblic shear planes. Vertisols generally have a high cation exchange capacity (CEC), >35 me.

Pelosols are deep clayey soils with angular blocky structure or prismatic structure, rare slickensides and cracks, but without oblic shear planes. Pelosols generally have a cation exchange capacity (CEC < 30 me).

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