MORPHOLOGICAL AND MICROMORPHOLOGICAL CHARACTERIZATION OF THE VERTIC LUVOSOL FROM ARDS ALBOTA PITESTI

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REVIEW, RESEARCH ARTICLE – ARTICLE

Abstract
Soil is a living organism and must be seen as a complex ecosystem. The biodiversity and ecological characteristics of a soil are strongly influenced by the edaphic environment of its property.
The purpose of this paper is to present aspects related to some properties (macromorphological and micromorphological) of Vertic Luvosol and the consequences of these properties in terms of productive and ecological potential.
The experiments presented in this paper were carried out at at ADRS Pitesti-Albota (Agricultural Development Research Station Pitesti-Albota, located in the South-Muntenia Region, in Argeş County. The soil types on which they were carried out were Vertic Luvisols.

Keywords: soil characterization, vertic luvosol
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INTRODUCTION

The soil profile is the result of the interaction between the parent material and the edaphic factors.

Pedogenetic processes and the anthropic factor can decisively influence the productive potential and ecological characteristics of the soil (Florea et al, 2013, 2014, 2015; Munteanu & Coteț, 2013).

The effectiveness of measures to increase the quality of the land for a certain use largely depends on the macro and micromorphological characteristics of the soil (Chiurciu et al, 2022; Dana et al, 2017, 2021, 2022).

Knowing them is a necessity in the conditions of a global resource crisis that requires increasing the efficiency of investments in an important field such as food safety and security (Chereji et al, 2022).

The soil participates in infinite production cycles and over time can improve its productive potential through rational use (Voicu, 2020, Voicu et al, 2022, Wilhite, 2000).

The earth is the source of grains but also the source of the planet's gold and why not the clock that measures humanity's time on Earth.

MATERIAL AND METHOD

The experimental plots are located in the Western Romanian Plain, Pitestiului Plain, ARDS ALBOTA, Figure 1. The Pitesti Plain is bordered to the south and southeast by the Găvanu-Burdea Plain and the Titului Plain and to the west by the Cotmenei Piedmont, to the north and northeast by the Argeşului Corridor and Gruiurile, the Gândeşti Piedmont and the Picior de Munte Plain.

The western and northeastern limits are well defined, being made up of slopes, the southern limit is not marked by unevenness and is considered where the terraces disappear into the surface of the plain, on the alignment of the localities of Găujani – Negraşi – Mozacu - Stavropolea and Mătăsaru.

The plain has an altitude between 350 m in the northern part and 180 m southeast of Găesti, it is formed by the terraces and the meadow of Argeş, it has a double inclination: to the east, to Argeş, in steps and to the south where the descent is continuous, according with the inclination of the terraces.

The terraces, in number of five, are developed on the right and arranged in a fan, and from a genetic point of view it is a plain of terraces dug by Argeş in a Piedmont plain.

The causes of this disposition are due to the recent elevation of the great Slătioarele-Pitesti anticline, which, in turn, rhythmically pushed the bed of the Argeş towards the east, but it can also be attributed to the continuous subsidence of the Romanian Plain to the east.

During the formation of the terraces, the Arges changed its course to the present one, which is arranged along a meadow, under the edge of the Gândesti Piedmont, and Teleormanul, Glavaciocul, Dâmbovnicul and Neajlovul inherited its old courses.

Figure1 **Experimental plots from ARDS ALBOTA PITESTI, GRIFOX Project**

Location of the soil profile

Vertic Luvosol-LVvs (SRTS 2003)

Vertic Hapludalfs (USDA-ST 1999)

Vertic Luvisols-LVvr (WRB-SR 1998)

Luvic-vertical brown soil-BPvs (SRCS 1980)

Location: Western Romanian Plain, Piteştiului Plain, ARDS ALBOTA, Piteşti (Figure 2);

Latitude: E 0240252'15.9";

Longitude: N 44047'59.8";

Absolute altitude: 334 m.

The determinations were carried out by using ICPA methodology, 1987.

Figure 2 **Soil profile of vertic luvosol, ARDS ALBOTA PITESTI, GRIFOX Project**

RESULTS AND DISCUSSIONS

Morphological characterization

Profile description:

Ap + El horizon, 0-22 cm; clay; brown - dark brown wet (10YR 3/2.5); unstructured; dry; weak plastic, friable; weak adhesive; frequent small berries; very frequent fine pores; clear undulating transition;

El horizon, 22-31 cm; clay; dark gray brown-very dark gray brown wet (10 YR 3.5/2); unstructured; pressed damp; weak plastic; friable; weak adhesive; frequent small berries; frequent fine pores; frequent thin roots, clear undulating transition;

EB horizon, 31-42 cm; clay; dark brown – dark grayish brown in wet condition (10 YR 4/2.5); medium subangular polyhedral, well developed; firm; dry; plastic; adhesive; frequent

small berries; frequent fine pores; rare thin roots; clear undulating transition;

Bt1yw2 horizon, 42-64 cm; clay; brown - dark brown wet (10 YR4/3) with large spots 10 YR 4/1; columnar large, well developed; reawaken; very adhesive; very plastic; cracks (1 cm diameter); oblique sliding faces; small rare berries; rare thin roots; wavy gradation;

Bt2yw2 horizon, 64-84 cm; clay; very dark brown wet (10YR 2/1.5); columnar large, well developed; reawaken; very plastic; very firm; very adhesive; cracks (1 cm diameter); oblique sliding surfaces; small rare berries; very rare thin roots; wavy gradation;

Bt3y horizon, 84-100 cm; clay; very dark brown - wet black (10YR 2/2); large, well-developed columnar structure; reawaken; very plastic; very firm; very adhesive; cracks (1 cm diameter); oblique sliding surfaces; small rare berries; straight transition;

Bt4y horizon, 100-136 cm; clay; wet black (10YR 2/1); large columnar well-developed structure; reawaken; very plastic; very firm; very adhesive; cracks (0.5 cm diameter); oblique sliding surfaces; small rare berries; straight transition; Bt5y 136-158 cm; clay; very dark brown wet (10YR 2/2); large columnar structure; well developed; damp; very plastic; very firm; very adhesive; oblique sliding surfaces; small rare berries; straight transition;

Bt6y horizon, 158-196 cm; clay loam; dark brown - very dark gray brown in wet condition (10YR 3/2.5); large columnar structure; moderately developed; damp; very plastic; very firm; very adhesive; oblique sliding surfaces; small rare berries; straight transition;

BC horizon, 196-223 cm; clay loam; dark brown wet (10YR 3/3); large columnar structure; poorly developed; damp; plastic; firm; adhesive; small rare berries; clear undulating transition;

C horizon, 223 – 240 cm; clay; dark brown wet (10YR 3/3); massive structure; very plastic; very firm; very adhesive; rare concretions of $CaCO_3$ that make moderate effervescence; otherwise, the soil does not effervesce.

Micromorphological characterization

Ap+El horizon, 0-22 cm: on the soil surface, in the first 1-1.5 cm, a structural crust was formed (Figure 3), as a result of the destruction of structural elements under the impact of raindrops.

Figure 3 **Crust on the soil surface in all plots (variants) studied from SCDA Albota, Pitești (Grifox Project)**

In the rest, the soil horizon has a structure with isolated, packing voids (Figure 4), due to the settling processes and a small-medium subangular polyhedral structure (determined by the physical-mechanical processes and the soil fauna), as a result of the friability of the soil matrix.

The soil skeleton consists of mineral grains the size of dust and fine quartz sand, fine mica flakes, feldspars, opaque minerals.

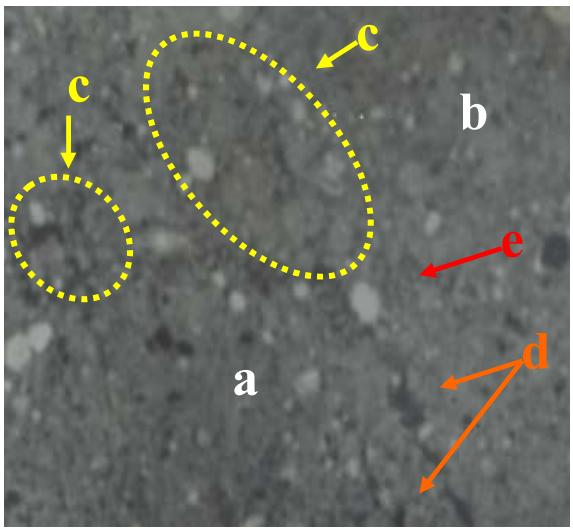

Figure 4 **Ap+El horizon (0–22 cm): slack zone, with relatively frequent pores (a); the compact zone, with sparse pores (b); areas processed by soil mesofauna (c); cracks also appear locally (d); iron ± manganese nodules (e), (Grifox Project)**

Finely shredded vegetable remains frequently appear within the horizon. Locally, looser, porous areas appear, processed by the soil mesofauna. Carbonized plant fragments were also observed.

Amorphous pedo-features - ferro-manganese nodules are very small, 0.5–1 mm and very rarely 2 mm. Some of them are fragmented.

El horizon, 22–31 cm: the structure is spongy (Figure 5), with packing and cracking voids, due to a strong subsidence of the horizon. Traces of soil fauna activity appear locally.

The soil skeleton is represented by mineral grains the size of dust and fine quartz sand, opaque minerals, feldspars, fine mica flakes.

Finely shredded vegetable remains are frequently present within the horizon. Carbonized plant fragments were also observed.

Fauna activity is very poorly represented, channels appear (but are in the process of being closed due to subsidence), which are created by lumbricides, but also coprolites created by soil mesofauna.

Amorphous pedo-features small ferro-manganese nodules (0.5–2 mm). Many of them are broken and fragmented.

The structure of the soil, favored by the texture and under the impact of agricultural works, is predominantly settlement, with isolated voids, packing, small-medium subangular polyhedral, spongy as a result of the friability of the soil matrix.

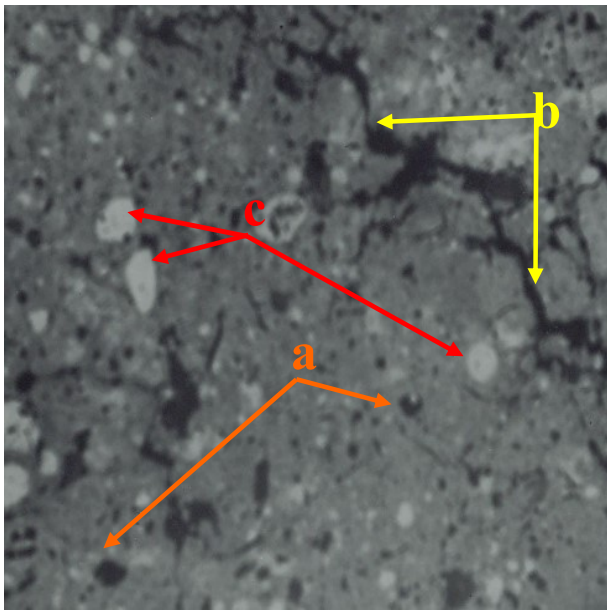

Figure 5 **El horizon (23–32 cm): compact zone with packing pores (a); cracks (b); iron±manganese nodules (c), (Grifox Project)**

The structural crust was formed on the surface of the soil, under the impact of raindrops (Figure 6) packing, small-medium subangular polyhedral, spongy as a result of the friability of the soil matrix.

The structural crust was formed on the surface of the soil, under the impact of raindrops (Figure 6).

Figure 6 **Structural crust formed on the soil surface, SCDA Albota, Pitești, (Project Grifox)**

The organic matter is found in a relatively small amount and is made up of both the humic fraction related to the inorganic component of the soil and plant residues.

Plant remains are very small (groups of cells, fragments of leaves or stems), which highlights their rapid transformation process.

The vertical processes are highlighted by the cracks that open from the ground surface (Figure 7).

Figure 7 **Cracks on the ground surface, SCDA Albota, Pitești (Project Grifox)**

Stagnogleyzation processes are manifested from the upper part of the soil and are highlighted by the presence of amorphous pedo-features. These are Fe±Mn nodules, which are numerous and very small in size.

CONCLUSIONS

The soil profile is located in Western Romanian Plain, Piteștiului Plain, ARDS ALBOTA, Pitești; Latitude: E 0240252'15.9"; Longitude: N 44047'59.8"; Absolute altitude: 334 m.

Vertic Luvosol has the following profile: Ap + El/El/EB/Bt/BC/C.

As a result of the destruction of structural elements under the impact of raindrops a structural crust was formed.

The impact of agricultural works, is predominantly settlement, with isolated voids, packing, small-medium subangular polyhedral, spongy.

Processes of stagnogleyzation are presented from the upper part of the soil and are highlighted by the presence of Fe±Mn nodules.

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