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# STUDIES ON THE MODIFICATIONS OF PHYSICO-CHEMICAL ATTRIBUTES OF ARABLE LANDS FROM THE WATER CATCHMENT AREA VALEA HARBOCA, LOCATED ON THE LEFT SLOPE OF SLANICUL DE BUZAU, COMPARED WITH THE STANDARD PROFILE

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## Abstract

*The soil study conducted in the water catchment area of Valea Harboca aimed the identification, characterization and evolution of soil coating under anthropogenic influence. In this regard, a control profile was opened (under natural regime) in order to trace, with its help, the evolution of the physico-chemical properties of the cultivated soils.*

*The soil types identified after analyzing eight main profiles are: chernozem, erodosol and antrosol, under the current system of soil classification.*

*The project presents a comparative study of the physico-chemical attributes of the arable soils from the studied perimeter, with the ones of the standard profile. Among them were selected: granulometric composition, Da, PT, pH and the humus content, on two depths 0-20 and 20-40 cm.*

## MATERIAL AND METHODS

For soil characterization, three alignments were set in the top, middle and lower region of the water catchment area, on which 10 main profiles were opened, whose description permitted the identification of the soil types existing in the region: chernozem, erodosol and antrosol. In this project, three representative profiles are presented for the studied area and a standard profile of the regional soil (chernozem). From the soil attributes, determined by laboratory tests conducted on samples harvested from the main profiles, the following were selected for presentation: granulometric composition, bulk density, total porosity, pH and the content in humus.

## RESULTS AND DISCUSSION

**Erodosol-cambic-calcaric (ph1)** is situated in the upper third of the right slope strongly inclined; with live farm use (it was arable). The soil formed on loess deposits, has uniform medium texture on profile and is excessively eroded. The soil formula and name below ground level is:
ER-ca-ka/k1d3e15-SL-l-Vn; *Erodosol cambic, carbonatic, semi-profound, excessively eroded by water, loess, medium clay, live.*

Morphological description of the profile

| | |
|---|---|
| **Aok** | **Aok horizon (0-17 cm)**: clay, 10YR3/2 color in wet condition and 10YR4/4 in dry condition, poorly developed granular structure, friable in wet condition, moderately cohesive in dry condition, slightly plastic and adhesive, moderately compact, strong effervescence |
| **Cn1k** | **Cn1k horizon (17-65 cm)**: clay, 10YR5/4 color in wet condition and 10YR6/5 in dry condition, unstructured, friable in wet condition, moderately cohesive in dry condition, slightly plastic and adhesive, moderately compact, strong effervescence, straight net crossing; |
| **Cn2k** | **Cn2k horizon (over 65 cm)**: clay, 10YR6/6 color in wet condition and 10YR7/6 in dry condition, unstructured, friable in wet condition, moderately cohesive in dry condition, slightly plastic and adhesive, moderately compact, strong effervescence, presents shell fragments |

**Gleic-Chernozem (ph2)** is located at the base of the left slope, arable agricultural use. The soil was formed on loess deposits, it had uniform medium texture and presented gleic horizon of oxidation-reduction (Go) from 63 cm in the profile. The soil formula and name below ground level is:
Cz-cb-gl/G3d6-SL-l/t-A; *Gleic chernozem, strong depth, loess and loess deposits, medium clay/medium loamy clay, arable*.

Morphological description of the profile

| | |
|---|---|
| Am | **Am horizon (0-26 cm)**: clay, colored in shades of 10YR2/1 in wet condition and 10YR2/3 in dry condition, wet, glomerular structure disturbed by cultivation, friable in wet condition, poor cohesive in dry condition, slightly plastic and adhesive, light, frequent cervotocine, cornevine and larvae places, gradual right passing. |
| Bv | **Bv horizon (26-63 cm)**: loamy clay, colored in shades of 10YR2/3 in wet condition and 10YR3/4 in dry condition, wet, well developed angular polyhedral structure, friable in wet condition, moderately cohesive in dry condition, moderately plastic, adhesive and compact, rare cervotocine and cornevine, gradual right passing. |
| Cn1 | **Cn1Go horizon (63-125 cm)**: clay, colored in shades of 10YR5/3 in wet condition and 10YR6/4 in dry condition, mottled appearance, it shows frequent 10YR3/1 color stains in wet condition, wet, unstructured, friable in wet condition, moderately cohesive in dry condition, moderately plastic, adhesive and compact, gradual right passing. |
| Cn2Gr | |

**Antrosolul – hortic (h4)** is located in the lower third of the right slope, arable agricultural use. By the leveling executed in the area, on the surface of the soil was deposited a humus material with a 60 cm thickness. The soil formula and name below ground level is:
At-ho/d5c63-SL-l/t-At; *Antrosol hortic, very profound, highly covered anthropic, loess and loess deposits, medium clay / medium loamy clay, arable.*

Morphological description of the profile

| | |
|---|---|
| Aho | **Deposited material (0-60 cm)**: clay, the color is not uniform and it's dark and its dominant shade is 10YR2/2 in wet condition, wet, unstructured (with glomerular fragments), friable in wet condition, moderately cohesive in dry condition, slightly plastic and adhesive, moderately compact, rare medium cracks, gradual right passing.<br>**C1 (Am) horizon (60-80 cm)**: loamy clay, 10YR3/2 color in wet condition and 10YR3/3 in dry condition, wet, poorly developed granular structure, friable in wet condition, moderately plastic, cohesive and compact, traces of roots, gradual right passing. |
| C1(Am) | C2 (Bv) horizon ( over 84 cm): loamy clay, 10YR4/4 in wet condition and 10YR5/4 in dry condition, wet, moderately developed angular polyhedral structure, friable in wet condition, moderately plastic, cohesive and compact. |
| C2(Bv) | |

**Chernozem (ph6**) is the standard profile, located at the base of the right slope, in an area without anthropogenic intervention, it is used as pasture. The soil was formed on loess and presented Cca horizon at the depth of 45 cm on profile. The soil formula and name below ground level is:
CZ-ca/k3d4-SL-l/s-Ps; *semi-calcareous* c*hernozem, moderately deep, loess and loess deposits, medium clay / sandy clay, pasture.*

Morphological description of the profile

| | |
|---|---|
| Am | **Am horizon (0-26 cm)**: clay, 10YR2/1 color in wet condition and 10YR2/3 color in dry condition, wet, partially disturbed glomerular structure, friable in wet condition, moderately compact in dry condition, slightly plastic and adhesive, light, frequent thin roots; |
| Bv | **Bv horizon (36-45 cm)**: clay, 10YR3/1 color in wet condition and 10YR3/3 color in dry condition, wet, partially disturbed polyhedral structure, friable in wet condition, moderately cohesive in dry condition, slightly plastic and adhesive, moderately compact, rare thin roots; |
| Cca | **Cca horizon (45-68 cm)**: clay, 10YR5/4 color in wet condition and 10YR6/5 in dry condition, wet, unstructured, friable in wet condition, moderately cohesive in dry condition, moderately plastic; |
| C | **Cn horizon (over 68 cm)**: clay, 10YR5/5 color in wet condition and 10YR7/6 in dry condition, wet, unstructured, friable in wet condition, moderately cohesive in dry condition, moderately plastic, adhesive and compact, strong effervescence, frequent $CaCO_3$ stains, it presents sand insertions. |

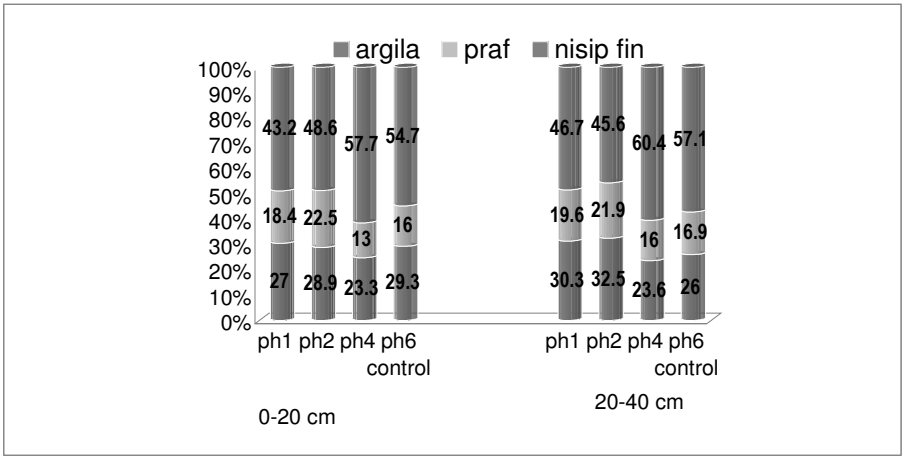


**Fig. 1. Granulometric composition, at the 0-20 cm and 20-40 cm depths, it the analyzed profiles**

In comparison with the clay content of the standard profile, it was observed: in the first 20 cm, the values diminish, compared with the control profile, by 0.4% at the gleic chernozem, by 2.3% at the erodosol cambic and by 6% at the antrosol hortic; in the next 20 cm, the clay content diminishes only at the antrosol hortic, by 2.4%, at the gleic chernozem and at erodosol cambic increases by 6.5%, respectively by 4.3%.

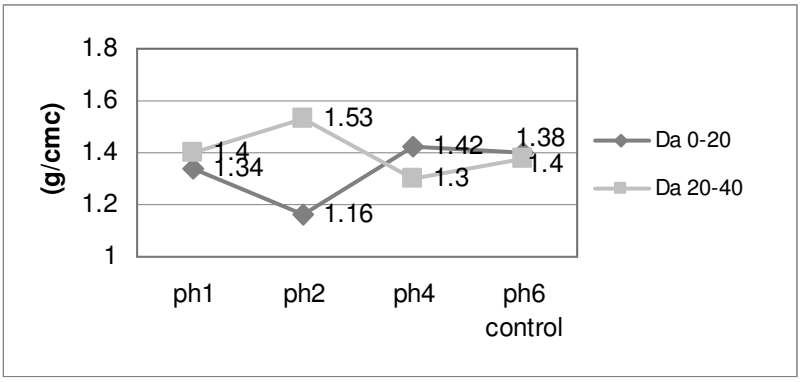


**Fig. 2. Bulk density values, at the 0-20 cm and 20-40 cm depths, at the analyzed profiles**

Bulk density values (Da) (Figure 2), in the first 40 cm, are close only at the standard profile and at erodosol. The largest amplitude of these values is registered at the gleic chernozem, whose pressing starts at 40 cm. The close values of the apparent density at antrosol show a uniformity of the material deposited on the soil surface by smoothing.

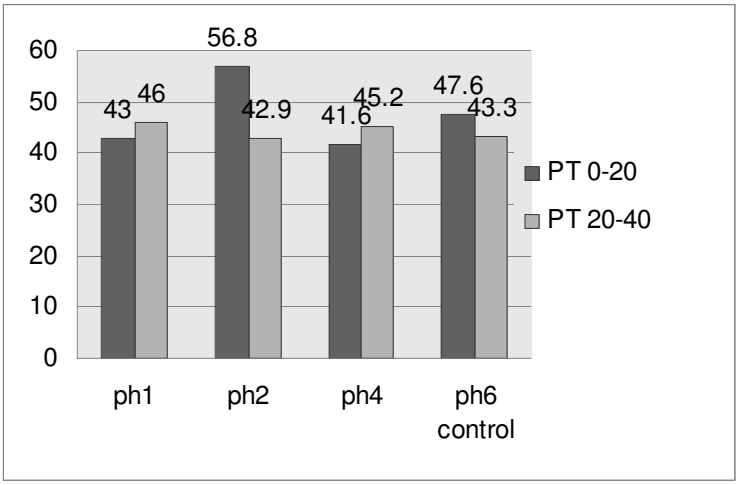


**Fig. 3. Total porosity values on the 0-20 cm and 20-40 cm depths, at the analyzed profiles**

In comparison with the standard profile, the gleic chernozem has the highest value of total porosity (PT) (Figure 3) in the first 20 cm. At erodosol and at antosol, the values are lower in the first 20 cm in comparison with the next 20 cm, due to agricultural usage.

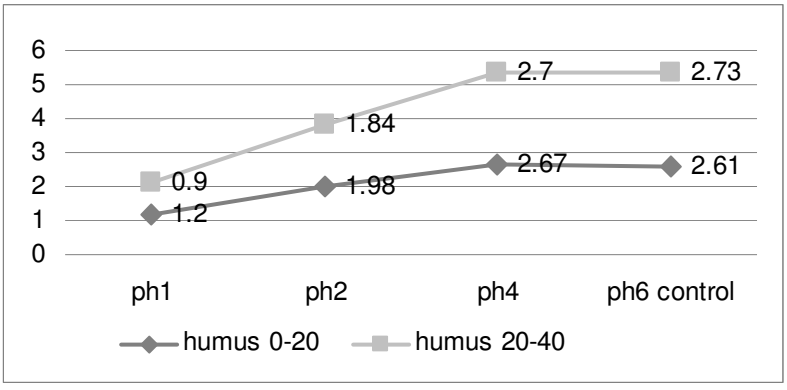


**Fig. 4. Values of the humus content, on the 0-20 cm and 20-40 cm depths, at the analyzed profiles**

The humus content (Figure 4) has the lowest value (0.9%) in the first 20 cm of the erodosol, in comparison with the value registered in the control profile, on the same depth (2.73%). Values close to those recorded in the standard profile pertain to antrosol, which justifies its classification in the hortic subtype.

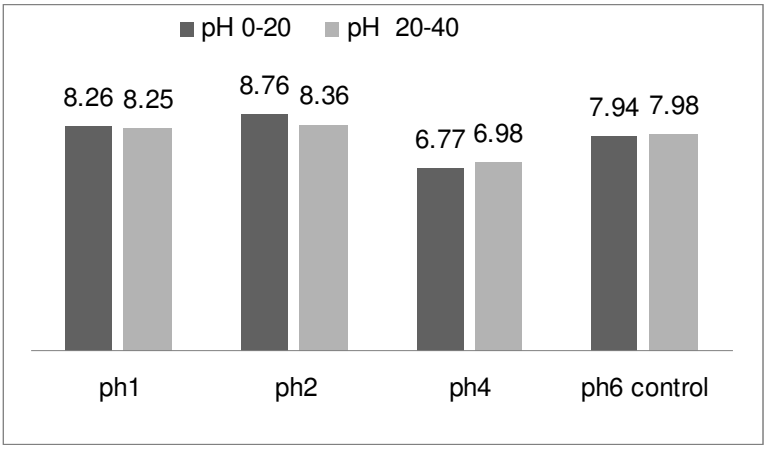


**Fig. 5. pH values, on the 0-20 cm and 20-40 cm depths, at the analyzed profiles**

From analyzing the data presented in Figure 5, it results that the values of the pH are relatively uniform in the first 40 cm at the studied profiles. The lowest pH values pertain to antrosol, and the highest to gleic cambic chernozem.

## CONCLUSIONS

1. The bulk density values (Da) (Figure 2), in the first 40 cm, are close only at the standard profile and at the erodosol.
2. The clay content has different dynamics on the two depths that were studied, in the first 20 cm the trend is ascending, and in the next 20 cm is descending.
3. At erodosol, and at antosol, the values of total porosity are lower in the first 20 cm than in the next 20 cm, due to agricultural usage.
4. The erodosol has the lowest humus content in the first 20 cm of the profile.
5. The pH values are relatively uniform in the first 40 cm at all studied profiles.

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