IDENTIFYING AND DESCRIBING SOILS IN THE EXTRA-URBAN AREA OF VOITENI, TIMIS COUNTY, ROMANIA

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Abstract. *This paper presents a description of the main soil types and sub-types outside Voiteni, Timis County, Romania. (8) To do so, we used data from our own observations during field work, data from previous studies, as well as data from the Voiteni town hall and from O.S.P.A. Timisoara. (10) On the studied territory, we identified poor, alkaline Gleyey chernozem; loamy, low-levigated chernozem; vertic, stagnogley preluvosol; and mollic, moist phreatic preluvosol. These soils are described depending on their physical and chemical features: texture, density, apparent density, total porosity, aeration porosity, reaction, humus content, carbonate content, and base saturation level, using the classical methods or different calculus formulas. (7)These soils are at the interference between the low plain from Jebel, Ciacova, Ghilad, and Banloc with the high plain corresponding to Lieblieng, Folea, and Gătaia, which produced an uneven relief with slopes of 1-5% from east to west and south-west. The mean altitude of the area tanged within 92 and 108 m. (1,4) Lithologically, the commune of Voiteni is characterised by a succession of strata of different age, thickness, and granulometric structure, depending on the meso- and micro-relief conditions. In general, both the subjacent rock and the parental one has a variable content of $CaCO_3$, and some of them have a high content of natrium as soluble salts or natrium carbonate (sodium muds). This, together with ground water at low depth and intensely mineralised have contributed to the genesis, in the low plain, of saline and alkaline soil types and sub-types. (5) The depth of the ground water in the low plain area corresponding to depression areas ranges between 0.5 m and 3 to 4 m in the higher areas. This caused the formation of gley, stagnogley, and moist phreatic soil sub-types. (2,6)*

Keywords: *soil identification, gley chernozem, loamy chernozem, vertic preluvosol, mollic preluvosol*

INTRODUCTION

The studied area is in southern Timis County, 36 km south from Timisoara and 7.5 km north from Deta, on the national road 59. The Commune of Voiteni neighbours Gataia in the south, Jebel in the north, Folea in the north-east (about 8 km), Birda in the east (about 10 m), Deta in the south, and Ghilad and Ciacova in the west. (3)

Geomorphologically, the area is part of the great physical and geographical unit "Tisa Plain", its eastern extremity being also known as the "Western Plain".

Lithologically, the commune is characterised by a succession of strata of different age, thickness, and granulometric structure, depending on meso- and micro-relief. The higher content of coarse sand points to their fluviatile origin, but the soils were later loessified.

In general, both subjacent rock and parental rock have a variable content of $CaCO_3$, and some of them have a high content of natrium as soluble salts or natrium carbonate (natrium muds). This, together with ground water at small depth and intensely mineralised have contributed to the formation and evolution of saline and alkaline soils in the low plain area. (5)

The land of the commune has a general slope of 1-5% from east to west, south-west. Mean altitude ranges within 92 m (in its south western extremity) and 108 m (in its eastern extremity). (9)

In the high plain, parental rocks are represented mainly by loessoid deposits (in north-east), with a predominant loamy-clayey texture or loams and clays (in south-east).

Because of the loamy-clayey texture predominant in the area and of the low permeability of the soils, these stagnant waters stay for long periods on agricultural lands.

The depth of the ground water in the low plain ranges between 0.5 m (in depression areas) and 3-4 m (in higher areas).

MATERIAL AND METHOD

To carry out the study, we used data from our own observations in the field as well as data from previous studies and from the Voiteni town hall.

To conduct physical and chemical analyses, we sampled soil that we analysed the following:

- Granulometric composition using a solution of spirit of salt according to the Kacinscki method, and separation of fractions through sieving and dropping;
- Apparent density, with metal in natural structure;
- Soil density, with a pycnometer, in distilled water;
- Soil reaction (pH), through the potentiometric method with a pH-sensitive glass electrode at a soil: water ratio of 1:2.5;
- Humus content, by oxidising organic matter from the soil with K bichromate in sulphuric acid and rating oxidant excess with Mohr salt after the Schollenberger method;
- Alkaline-earthy carbonate, with the Scheibler method.

We also calculated:

- Total porosity: PT = (1- DA/D)*100 (%)
- Aeration porosity: Pa= PT-CC*DA/

RESULTS AND DISCUSSION

On the studied territory, we identified poor, alkaline gley chernozem; loamy, low-levigated chernozem; vertic, stagnogley preluvosol; and mollic, moist phreatic preluvosol.

1. Poor, alkaline gley chernozem. This soil has the following physical and chemical features:

- Texture: medium loamy-clayey, not differentiated along the profile;
- Density: between 2.65 g/cm^3 in the horizon Ap and 2.73 g/cm^3 in the horizon Cca;
- Apparent density: between 1.01 g/cm^3 in the horizon Ap and 1.47 g/cm^3 in the horizon Aph, extremely low and medium;
- Total porosity: it decreases with depth from 61.8% in the horizon Ap to 46.2% in the horizon C/Ak, extremely high to medium; aeration porosity decreases from 35.2% in the horizon Ap to 7.8% in the horizon C/Ak, very low to very high;
- Soil reaction: low acid to moderate alkaline, with pH between 6.55 in the horizon Ap and 8.67 in the horizon CcaGo◦;
- Humus content: low and medium, ranging from 1.47% in the horizon Am and 3.47% in the horizon Ap;
- Carbonate content: low, increasing with depth from 0.1% in the horizon Am to 20.04% in the horizon Ccag.

2. Loamy, low-levigated chernozem. This soil has the following physical and chemical features:

- Texture: loamy-clayey, not differentiated along the profile;
- Density: increasing from 2.63 g/cm^3 in the horizon Ap to 2.71 g/cm^3 in the horizon Bt;
- Apparent density: between 1.05 g/cm^3 in the horizon Ap and 1.58 g/cm^3 in the horizon A/B, extremely low and high;
- Total porosity: decreasing from 60.8% in the horizon Ap to 41.4% in the horizon A/B, low and extremely high; aeration porosity is extremely low to very high, ranging between 1.3% in the horizon Am and 32.6% in the horizon Ap;
- Soil reaction: moderate acid to low alkaline, with pH between 5.51 in the horizon Ap and 8.35 in the horizon Ck;
- Humus content: between 1.82% in the horizon Am and 3.27% in the horizon Ap, low to medium;
- Carbonate content: low to medium, between 0.08% in the horizon B/C and 6.46% in the horizon Ck.

3. Vertic, stagnogley preluvosol. This soil has the following physical and chemical features:

- Texture: loamy-clayey until 50 cm in the soil, then clayey-loamy until 90 cm, and then again loamy-clayey;
- Density: between 2.67 g/cm^3 in the horizon Ap and 2.71 g/cm^3 in the horizon $Btyw_5$;
- Apparent density: medium and low, between 124 g/cm^3 in the horizon Ap and 1.51 g/cm^3 in the horizon $Btyw_5$;
- Total porosity: between 41.0% in the horizon $Aphw_3$ and 53.6% in the horizon Ap; aeration porosity ranges between 20.8% in the horizon $Btyw_5$ and 28.4% in the horizon Ap, being medium to high;
- Soil reaction: moderate acid and low alkaline, with pH increasing from 5.44 in the horizon Ap to 8.20 in the horizon Cw_2;
- Humus content: decreases with depth from 3.25% in the horizon Ap to 1.66% in the horizon A/Bw_4;
- Carbonate content: low, between 0.16% in the horizon B/Cw_4 and 0.5% in the horizon Cw_2.

4. Mollic, moist phreatic preluvosol. This soil has the following physical and chemical features:

- Texture: medium loamy-clayey, not differentiated along the profile;
- Density: between 2.60 g/cm^3 in the horizon Ap to 2.72 g/cm^3 in the horizon A/B;
- Apparent density: very low and high, between 1.18 g/cm^3 in the horizon Aph and 1.59 g/cm^3 in the horizon Am;
- Total porosity: low and very high, between 41.1% in the horizon Am and 54.6% in the horizon Ap; aeration porosity ranges between 3.0% in the horizon Aph and 23.9% in the horizon Ap, being extremely low and high;
- Soil reaction: moderate acid to neuter, with pH between 5.57 in the horizon Ap and 7.16 in the horizon B/C;
- Humus content: between 3.55% in the horizon Ap and 1.52% in the horizon Am, the soil being medium and low supplied in humus.

CONCLUSIONS

The studied area is in the Timis River basin, the Birda Basin. There are no watercourses in the studied territory.

In this paper, we pointed out a few limiting factors such as fine texture, porosity, compactness, alkalinity level, moisture excess, land unevenness, land slope, and humus supply.

Among the soils identified, the best physical and chemical features are those of the mollic preluvosol, followed by gley chernozem and loamy chernozem.

Soil texture is loamy-clayey in all four soil sub-types.

Soil reaction is from low acid to moderate alkaline with pH between 6.55 in the horizon Ap and 8.67 in the gley chernozem; between 5.51 in the horizon Ap and 8.35 in the horizon Ck in the loamy chernozem; between 5.44 in the horizon Ap and 8.20 in the horizon Cw_2 in the vertic preluvosol; and between 5.57 in the horizon Ap and 7.16 in the horizon B/C in the mollic preluvosol.

Soil humus content ranges between 1.47% in deep depths and 3.55% in the surface horizon in the mollic preluvosol.

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