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SURFACE EROSION AND INFLUENCE THEM ON THE PROPERTIES AND PRODUCTIVE CAPACITY ON THE SLOPING LANDS IN THE SOUTH-WESTERN AREA OF OLTENIA

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Abstract
Within the south-west zone of Oltenia there are large surfaces occupied by soils affected by surface erosion. Among them, there are antrosol erodic encountered on the sloppy slopes with 3-35% declination, in which conditions the accelerated erosion led to the removal of the most part of the soil profile in such a way that the remaining profile does not identify the former soil profile.
The present researches have been taken into consideration an erodic arch anthrosol and erodic cambic anthrosol , both with a low humus content and mineral nutrients and a low natural fertility.
Key words: slope, slope, erosion, erodic anthrosol , fertility

INTRODUCTION

Agricultural land located in slope occupies, at present, in Romania 48% of the area of this foosins . However, they represent a source with a productive potential still insufficiently capitalized, due both their irrational exploitation, as and consequences erosion process, imminent for also lands. Erosion is showing intensive and in various forms, constituting a destabilizing factor of the ecosystem where act, determining pollution environment respectively.

On steep slopes, where surface erosion is accelerated, the material requested is very quickly transported to the base slopes, like this that from the soil profile a small portion remains or it is enough even to the parent material. In this case they were identified as soils in the researched area anthrosols erodice .

These were delimited on the slopes knead with a high slope, over 30 – 35%. In these terms accelerated erosion, removed the most of the profile soils, thus that the profile portion left never again could emphasize old soil subject erosion process.

In depending on the intensity erosion process and of the nature of the parental material, in the south-western area of Oltenia they were encountered. May many soil units eroded that are found complex:

- typical erodic anthrosol;
- erodic cambium anthrosol;
- argic erodic anthrosol.

MATERIALS AND METHODS Research the soil was made on land , and in laboratory . research on land was realized in the northwestern part of Dolj county, the localities area willow and Argetoaia , where a series of natural pedogenesis factors have acted over time. The relief, as a natural factor in the genesis of soils in this area, determined the formation of soils characteristic of lands located on slopes. In land , they were located and executed one profile each in each locality , on Lands with slope over 30%. It's done the description profile morphology (number and succession horizons , thickness , color , texture, structure, porosity , compactness , neoformations) and soil samples were collected from each horizon , starting from the base the profile by surface .

Samples collected from the field were analyzed in the pedology laboratory and at OSPA Dolj, where the physical, hydrophysical and chemical properties of the soils affected by the erosion process were determined.

Soil research in the field and in laboratory , was realized conformable instructions recommended by the Research Institute for Pedology , Agrochemistry and Protection ENVIRONMENT from Bucharest.

On the basis Methodology for the development of pedological studies 1987, and of the Romanian Soil Taxonomy System, 2012, using the data collected from the field, from the study of soil profiles and those of laboratory analyses, the soil units were established.

RESULTS AND DISCUSSIONS For the characterization of these soils, two soil profiles were described and analyzed, one for argic erodic anthrosol and another for cambic erodic anthrosol, which occupy the largest surfaces.

Argy erodic anthrosol

For the morphological description of this soil, a soil profile was executed north of the town of Salcia, Dolj county, at a distance of 1000 - 1500 m, on a northern slope with a slope over 35%. The method of use is natural pasture and the parent material is represented by clays. The soil is characterized by a BtC – C_1 – C_2 type profile.

BtC horizon: 0 19 cm, color brown-yellowish (10 YR6/4) in the wet state and yellow-brown (10YR7/4) in the dry state, clayey-loamy texture, large or small bouldery angular polyhedral structure, finely porous , compact, rare fibrous roots, rare yellowish-whitish spots, very weak effervescence, slow passage.

Horizon C_1: 19 – 65 cm, brownish yellow color (10 YR6/6) in the wet state and yellow color (10 YR7/6) in the dry state, clay-clay texture, unstructured, appearing as a compact mass, fine porous, copact, rare fibrous roots, frequent yellowish-whitish spots, moderate effervescence, slow passage.

Horizon C_2: below 65 cm, light yellow color (10YR7/4) in the wet state and yellowish-whitish color (10YR8/4) in the dry state, clay-clay texture, unstructured, fine compact porous, frequent whitish spots, strong effervescence.

Main physical properties

From a granulometric point of view (fig. 1) the Argic erodic anthrosol is characterized by a very low percentage of coarse sand (below 0.2%). The fine sand increases on the profile from 25.15 to 31.27%, and the dust fraction decreases on the profile from 23.78 to 19.51%. The highest percentage of the total granulometric fractions is represented by clay, which in the first horizon drops to 48.94%. On the entire profile, the textural class is clayey-loamy, the soil being characterized by a weak textural differentiation between the horizons.

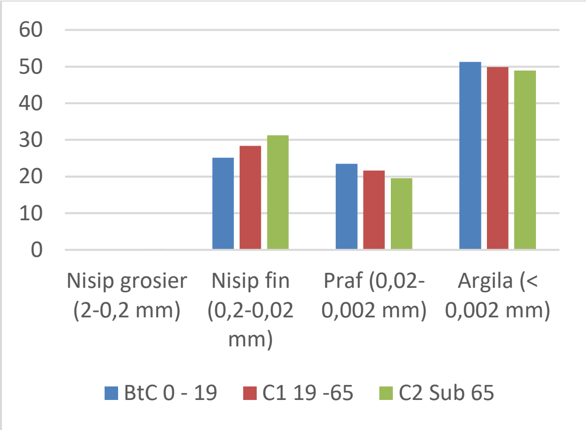

Fig. 1 Granulometric composition of the argic erosive anthrosol

The apparent density has high values from the surface and increases along the profile from 1.48g/cm^3 to 1.59 g/cm^3. The same increase is recorded in the density of the soil, from 2.66 cm^3 in the first horizon to 2.69 cm^3 in the parent material. Total porosity is low throughout the profile, ranging from 44% at the surface to 41% at depth. The aeration porosity has very low values, decreasing from 7% in the BtC horizon to 2% in the C_2 horizon (fig. 2).

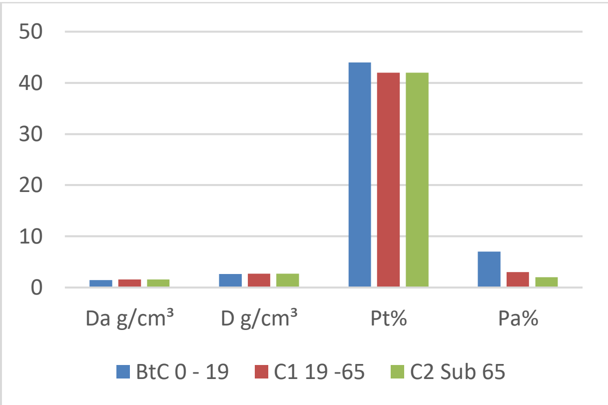

Fig. 2. The physical properties of the argic erodic anthrosol

The main hydrophysical properties

The hydrophysical indices follow the value of the evolution of the percentage of clay and organic material, registering a slight decrease from the surface to the depth. Thus, the maximum hygroscopicity coefficient has the value of 11.07% in the first horizon and decreases to 10.43% in depth. The wilting coefficient decreases from 16.27% to 15.33% and the moisture equivalent decreases from 33.15% to 31.98%. The water field capacity of the soil remains almost constant throughout the profile, having values around 24%.

An approximately constant value is also registered by the useful capacity for water, which is around 16% (fig.3).

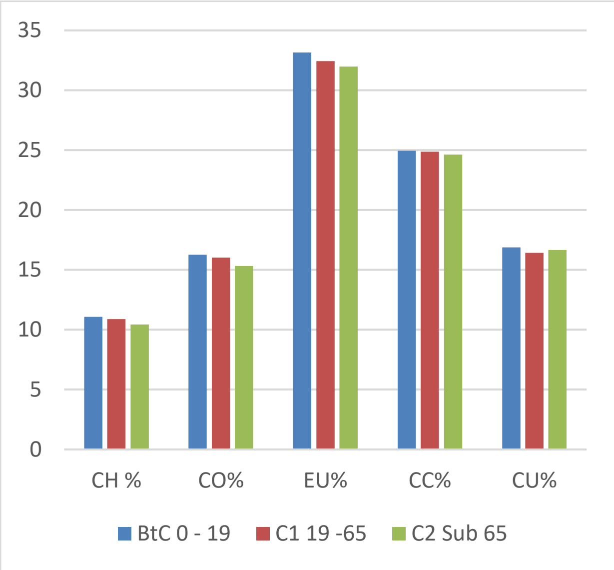

Fig. 3 The hydrophysical properties of the argic eroding anthrosol

Main chemical properties

The argic erodic anthrosol from the south-western part of Oltenia is poorly supplied with organic material, the humus content is 1.28% in the BtC horizon and it is only 0.48% in the C $_2$ horizon . The reaction of the argiloiluvial regosol is weakly alkaline, the pH value increasing from 7.9 in the BtC horizon to 8.3 in the C $_2$ horizon (fig. 4).

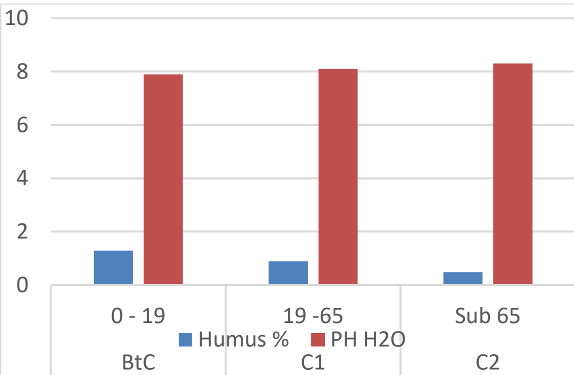

Fig. 4 The humus content and the pH value of the argic erodic anthrosol

The soil is very poorly supplied with total nitrogen, the content in this element decreasing from 0.068% to 0.032% along the soil profile. The mobile phosphorus content is low and very low, being between 9.5 pp and 2.3 ppm. The soil is well supplied with mobile potassium in the surface horizon (262 ppm) and moderately supplied with this element in the other horizons (fig. 5).

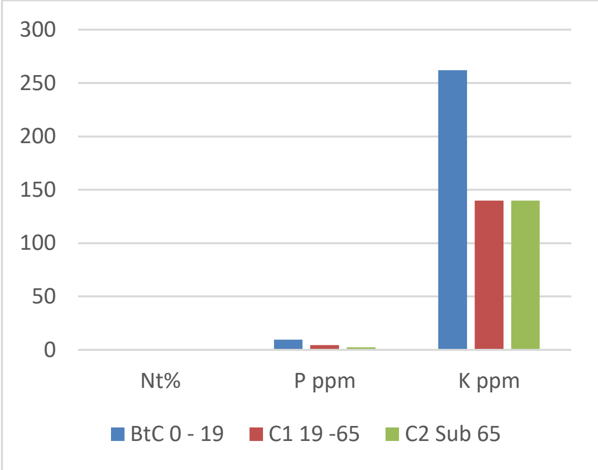

Fig. 5. The content of chemical elements in the Argy erodic anthrosol

The colloidal complex is saturated with basic cations, therefore the degree of saturation in bases is 100% (fig. 6).

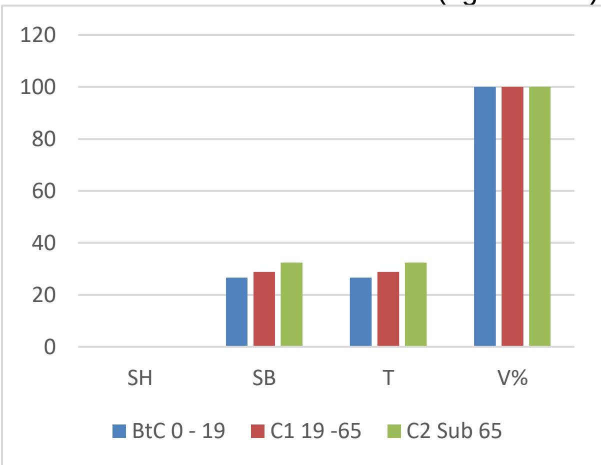

Fig. 6 The colloidal complex of the argic erosive anthrosol

Cambic erodic anthrosol

For this soil, the morphological description of a profile located south of Argetoaia locality, county Dolj, at a distance of approximately 1000 – 1500 m. The relief is represented by kneaded slopes with a slope of more than 30%. The material is represented by clayey marls or marly clays and the way of use is represented by vine plantations.

BvC horizon: 0 – 16 cm, yellowish color (10 YR5/6) in the wet state and yellow-brown color (10YR6/6) in the dry state, loamy-clay texture, unstructured, porous medium, compact, frequent fibrous roots , shows yellowish whitish spots, moderate effervescence, gradual passing.

Horizon C $_1$: 16 – 42 cm, yellow-brown color (10YR6/6) in the wet state and yellow color (10YR7/6) in the dry state, loamy-clay texture, unstructured, fine porous, rare fibrous roots, frequent whitish spots, moderate effervescence, gradual transition.

Horizon C $_2$: 42 – 97 cm, yellowish brown color (10 YR6/8) in wet state and yellow color 910YR7/8) in dry state, loamy-clay texture, unstructured, fine porous, compact, frequent whitish spots, moderate effervescence , clear passage.

Horizon C $_3$: below 97 cm, gray-brown color (10YR6/2) in wet state and gray-brown color (10YR7/2) in dry state, loamy-clay texture, unstructured, fine porous, compact, frequent whitish spots, moderate effervescence.

Main physical properties

From a granulometric point of view, cambic erodic anthrosol shows a slightly higher percentage of coarse sand in the first horizon (2.50%) after which it gradually decreases to 0.2%. And the highest percentage of fine sand (36.85%) is also recorded in the first soil horizon, after which it decreases to around 30%. Compared to the sand fractions, the dust granulometric fraction has the lowest value in the surface horizon (20.14%), in the other horizons increasing to 27-28%.

And in this soil, the dominant granulometric fraction is clay, but it registers a lower percentage of 40% in the first three horizons and 39% in the last horizon (fig. 7).

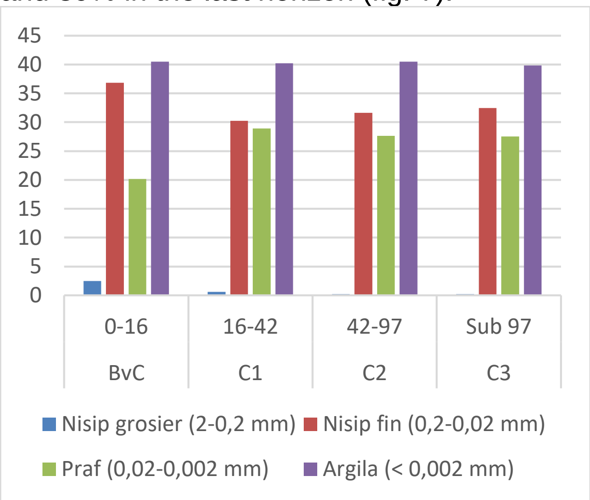

Fig. 7 Granulometric composition of cambic eroding anthrosol

This granulometric composition generally gives the soil a clay-clay or clay-clay texture.

The apparent density has high values, increasing from 1.44 g/cm ^{3} to 1.59 g/cm ^{3} , highlighting the strong compaction of the soil from the surface. The same can be said about the density, which increases from 2.63 g/cm ^{3} to 2.69 g/cm ^{3} .

Porosities with small values on the surface, with a tendency to decrease in depth, reinforcing the statement made earlier of strong soil settlement especially in the lower part (fig. 8).

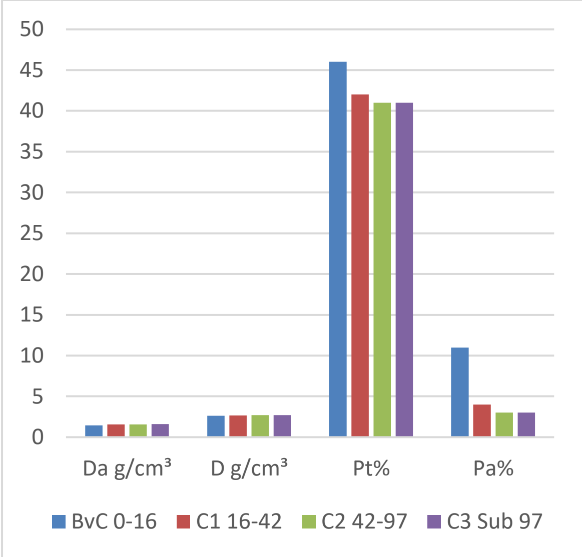

Fig. 8 Physical properties of cambic erodic anthrosol

The main hydrophysical properties

All the hydrophysical indices that characterize this soil tend to decrease from the surface of the profile towards its base. The higher values of the hydrophysical indices in the first horizon are determined by the slightly higher organic material content than in the other horizons. Thus, the wilting coefficient decreases from 14.33% to 12.92%, the moisture equivalent decreases from 24.27% to 23.77%.

The useful water capacity registers a much lower value than in the argic erosion soil, being around 12%, this low value being determined by the lower percentage of clay and humus, as well as by the strong compaction of the soil (fig. 9).

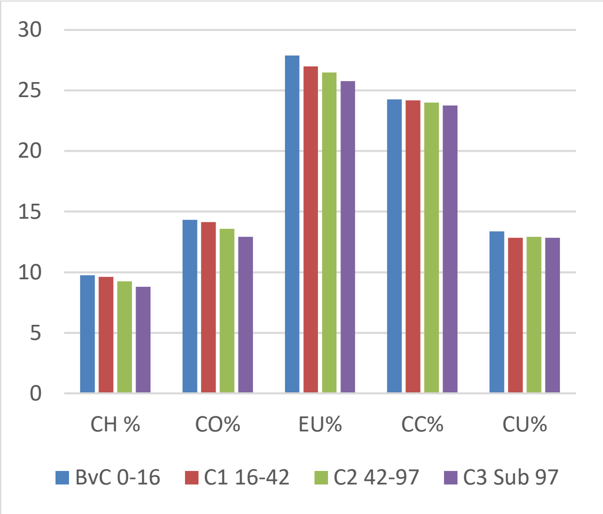

Fig. 9 The hydrophysical properties of cambic erodic anthroso

Main chemical properties

Cambic erodic anthrosol, contains a lower percentage of humus than Argic erodisol. In the surface horizon, the humus content is 1.01% and in depth it decreases to 0.26%. The reaction of the soil is weakly alkaline, the pH value increasing from 8.1 to 8.4 on the depth of the profile (fig. 10).

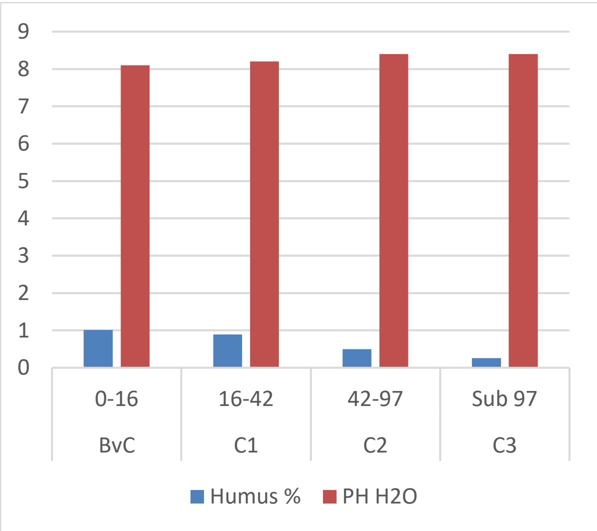

Fig. 10 Humus content and pH value in cambic erodic anthrosol

The cambic erodic anthrosol is also very poorly supplied with total nitrogen, the content in this element decreasing on the profile from 0.053% to 0.014%.

The soil is the medium supplied with mobile phosphorus and potassium, the content of these elements being 19.5 ppm and 158 ppm, respectively. The high content in these elements can be explained by the application of mineral fertilization by the owners (fig. 11).

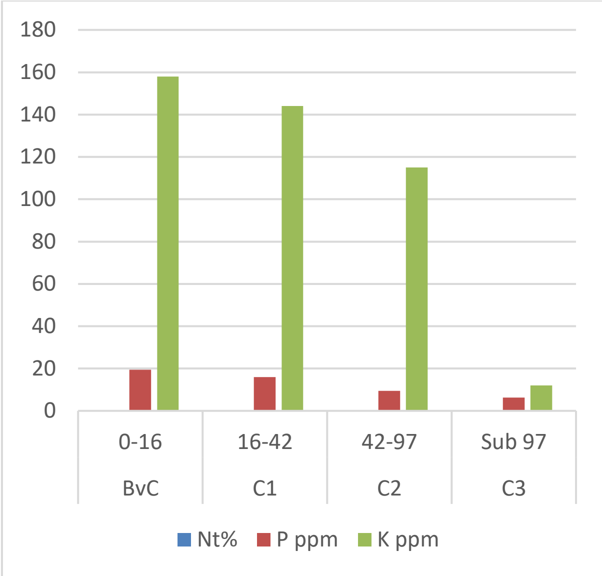

Fig. 11 The content of chemical elements in cambic erodic anthrosol

The colloidal complex is saturated with basic cations, and the degree of saturation in bases is 100% (fig. 12).

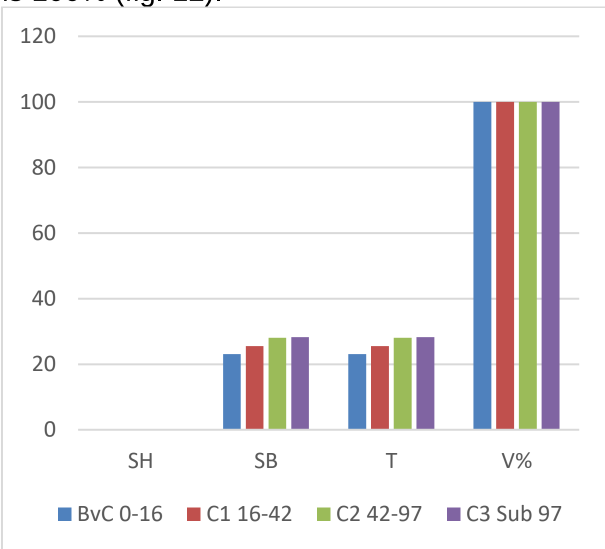

Fig. 12 The colloidal complex of cambic erodic anthrosol

CONCLUSIONS

Eroding anthrosols have a very low productive capacity, mostly being covered with clumps of forests or with dense vine plantations.

To improve these soils would require radical works to combat soil erosion through terracing and an organo-mineral fertilization with large amounts of fertilizers.

Since these works are very expensive and economically inefficient, the most practical use is afforestation and afforestation.

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