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OBSERVATIONS ON THE PRESENCE RHODI-EUTRIC CAMBISOLS (TERRA ROSSA) IN ROMANIA

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Abstract

Rhodi-eutric cambisols is a dominating in the mediterranean regions, its presence being connected to limestone that is the most times jurassic. The soil origin material is represented by the residues of the limestone dissolving.
Rhodi-eutric cambisols also appears locally in the west side of the country and in submediterranean climate conditions (Banatului Mountains) and in climate conditions (humid climate) with oceanic influences (Apuseni Mountains) and in the most frequent cases associated with rendzic leptosols, eutri-lithic leptosols and rocks.
From the most recent field and laboratory data results that the rhodi-eutric cambisols soils develop also in present if some morfohidroclimatic conditions are fulfilled.

Key words: *rhodi-eutric cambisols, limestone, rubescent.*

INTRODUCTION

Rhodi-eutric cambisols is a dominating in the mediterranean regions, its presence being connected to limestone that is the most times jurassic.
In Romania was separately under the name of terra rossa on the first map of the soils by G. Murgoci (1910). Much later (1952) M. Popovat and M. Spirescu publishes a note on red soil, naming them 'red soils of cones' and passes them into the category of terra rossa soils, because at the same time, there is a tendency to refer to terra rossa any red soil.
In 1970, M. Popovat et al. consider soil type terra rossa as relict have been delivered two main ways of developing it: one, in big bags or sinkholes formed on limestone dissolution in their (the bath), another on hillsides, as deposits delluvial (Mehedinti Plateau, town North Nadanova).
Terra rossa is in fact in Romania in the West and southwest of the country where it occupies an area of about 50.000 ha (0.2%), both in the sub-mediterranean climatic conditions (Mehedinti Plateau, Banat Mountains), as well as in the more humid climate conditions, with oceanic influences (Apuseni Mountains).

MATERIALS AND METHODS

The field studies consisted of mapping and spatial reambulating the studied area on maps at 1:10.000 and 1:25.000 scale, with collection of numerous soil and groundwater samples, with observations on relief, micro-relief, parent material, etc.
The basic basic research and mapping unit of the areas with chromic luvisols was the soil profile, thus allowing the study of morphological characteristics of the soils. As a result, soils were classified based on intrinsic properties, namely the soil profile, taking into account diagnostic horizons and characteristics.
Soil profiles were located on the ground so that to form a network of studied points. The method of parallel routes, located almost at equal distances has been used, to cover more or less uniformly the whole working area.
The morphological description of soil profiles was done according to the Romanian System of Soil Taxonomy (SRTS, 2003, 2012), ICPA, Bucharest.
In order to establish the soils diagnosis, their morphological features have been taken into account, namely the thickness of morphological

horizons, color, texture, structure, composition, adhesion, etc.
Soil samples were taken from genetic horizons both in modified and unchanged settings.
In modified settings, soil samples of 20 cm thickness were taken in bags, for the chemical characterization to be carried.
In natural (unchanged) settings, soil samples were taken using a metal cylinder of known volume (200 cm^3), to characterize the physical and hydro-physical features, as well as the momentary soil moisture.
The following methods have been used for the physical and hydro-physical features:
Particle size analysis (granulometry) :

- pipette method for fractions < 0.002 mm, including;
- wet sieving method for fractions from 0.002 to 0.2 mm and dried sieving method for fractions > 0.2 mm

For the the textural classes and subclasses, we used the Romanian system, according to the Methodology developed for soil studies, ICPA, 1987.
Bulk density (AD) method: metal cylinder of known volume (200 cm^3) for the momentary soil moisture.
Total porosity (TP): by computing PT = (1-AD/ D) *100
The chemical characteristics were determined using the following methods:
Total nitrogen (Nt): Kjeldahl method, decomposition of H_2SO_4 at 350°C, catalysts: potassium sulphate and copper sulphate.
pH: potentiometrically, with glass and calomel combined electrode, in aqueous suspension, at the ratio of ½, 5.
Humus: wet oxidation (Walkley-Black method, modified) and results expressed in percentage.
The base saturation degree (V%) and total cation exchange capacity (T me/100 g soil), by calculation.

RESULTS AND DISCUSSIONS

The soil origin material is represented by the residues of the limestone dissolving and in terms of relief, its current physiognomy is due to the space and time in a hybrid of those two factors morfogeneticy, are in a close interaction, namely the litologycal and hydrologycal. The morphological type of karst topography, at least in the Apuseni Mountains, the plateau is the major features advanced flattening, sometimes and a pronounced development of closed endorheic Basins (Figure 1).

Figure 1. Depression Ocoale

In dolines shallow (2-3 m) and very flared, terra rossa formation is taking place from calcaric cambisols and very deep for the leptosols and rocks prevailing.
Karst morphology is present, moreover, in the territory through a range of specific forms of relief of dissolution, which frequently occur buried ditches and dolines, the latter varying sizes, from a few meters to tens of meters in diameter and up at 10-15 m depth (Figures 2 and 3).

Figure 2. Dolines with microdolines the perimeter Mununa

Figure 3. Buried ditches the perimeter Poiana Calineasa

As regards the genesis of terra rossa soils there were different opinions. According to some authors (Reifenberg, Whittles, 1947) the formation of these soils would be limestone that the deterioration in the conditions of a mediterranean climate, generate residual formations of red color. Are considered relict paleosols and soils which could keep rubescent in contemporary conditions, but which develops some soil materials present.

N. Florea et al. (1968) believes that the present climate conditions where today the terra rossa soils are favorable to rubescent. They seem to have developed under a warmer climate the geological epochs earlier when rubescent was used. The current climate only allows keeping original colour of these soils under certain conditions of the relief.

V. Glavan (1973) believes that current conditions are not favorable climate terra rossa soil formation, the more they favor keeping the color red for some time, as the soil is less deep and creates a drier topoclimate.

A team from the ICPA (1987), dealing with the chemistry and mineralogy of bauxite material formed rhodi-eutric cambisols from Ciucarul Grand Massif, believes that the genesis rhodi-eutric cambisols (terra rossa) is mainly determined by parent material nature. Their occurrence is explained by parental rock composition containing kaolinite and iron oxides which conveyed land.

In our opinion the formation of terra rossa soils is possible and if the conditions are met, the hidroclimatice rock and the geomorphological. Not all conditions of the drainage of the soil work rubescent.

Coloring intensity is conditional on the state of hydration of iron in limestone residues and iron content of these residues. In the area of Ghetari-Poiana Calineasa (Bihor Mountains), where the climate is favorable humidity pseudogleizarii (annual average temperatures of 4.5°C and rainfall in excess of 1.400 mm/year frequently) on parental materials generated from limestone, but in different drainage conditions are rendzinas, eutric cambisols and rhodi-eutric cambisols.

The latter appear on the soil surface, although distinct family buried limestone crevices and ditches, water loses a first time favoring iron hydroxide hydrate and then hydrate it with the formation of goethite (Fe_2O_3) and hematite.

In other words, during spoilage develops a very active manner physico-chemical interaction when soils rich in calcium carbonate and iron oxide hydrate and dehydrate.

In the absence of such active interactions in soil instead of terra rossa is built calcaric cambisols or rendzinas characterized by a high humification, low thickness and can with great content of skeleton.

The territories to which we have referred, terra rossa profile is characterized by a type *Ao-AB-Bv-R* poorly developed (50-80 cm), clay content of between 43-57%, apparent density (1.10 to 1.29 g/cm3), high total porosity (54-58%) and permeability medium (2.0 to 3.6) (Table 1, Figures 4 and 5).

Table 1. Physical and hydro-physical concerning the rodhi-eutric cambisols

Horizon	Depth (cm)	Clay (< 0.002 mm)	DA (g/cm^3)	PT (%)	K (mm/h)
Ao	0-12	43.1	1.10	58	2.4
AB	12-25	46.3	1.21	54	3.6
Bv1	25-63	48.7	1.21	56	2.0
Bv2	63-140	56.5	1.29	56	0.6

Figure 4. Rhodi-eutric cambisols (Terra rossa)

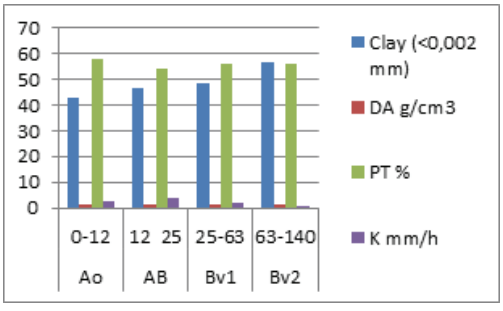

Figure 5. Variation of the physical and hydro-physical of rodhi-eutric cambisols

From a chemical reaction these soils have a moderately weak acid (5.5 to 6.8) and a small-medium humus content (4.0 to 6.5%). They have a high base saturation between 63-75% and a good supply of nitrogen (0.200 to 0.300%) (Table 2, Figure 6).

Table 2. Chemical data concerning the rodhi-eutric cambisols

Horizon	Depth (cm)	pH	Humus (%)	V (%)	Total N (%)
Ao	0-12	5.5	4.5	63	0.224
AB	12-25	5.7	3.9	70	0.195
Bv1	25-63	5.7	1.9	75	0.097
Bv2	63-140	6.8	-	-	-

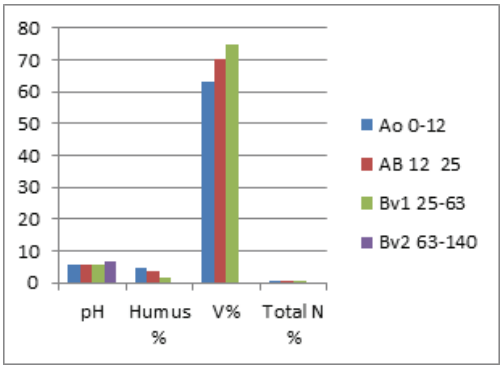

Figure 6. Variation of the chemical of rodhi-eutric cambisols

CONCLUSIONS

Genesis terra rossa soil is not sufficiently known. Different opinions were issued, focusing on the fact that these soils would be formed on limestone, but only under a sub-sediterranean and mediterranean climate or interpreted as paleosols and relict soils.

Our view is that such soils are formed under certain conditions hydroclimatic now, draining the soil and geomorphological rubescent work.

Terra rossa soils have a low volume edaphic small – medium, fertility forest but relatively good for pastures and meadows.

REFERENCES

Grigorescu Adriana, Craciun C., Piciu I., Curelariu Gh., Florea N., 1987. Chemistry and mineralogy of red soil formed on material bauxite. ICPA Annals, Vol XLVIII, Bucharest.

Parichi M., Stanila Anca-Luiza, 2002. Complex pedological research in the Gârda Seaca-Ordâncusa-Poiana Calineasa (Bihorul Nordic) area.Volume Possibilities of sustainable development of a traditional region form the Eastern Europe.

Popovat M., Oancea C., 1970. Terra rossa, a relict soil in southwestern Romania. Technical and Economic Studies, Series C, No. 17, Geological Institute, Bucharest.

Stanila Anca-Luiza, Parichi M., Reif A., Herisanu Gh., Rascu I., 2005. Considerations about the influence of parental rock over the formation and evolution of soils of the Gârda Seaca-Ordâncusa located (Bihorul Nordic) . Factors and processes in the temperate areas pedogenetic, Volume no. 3, The new series, Alexandru Ioan Cuza Publishing House, Iasi.