THE STUDY OF ERODOSOILS AND COLLUVIC ALLUVIOSOILS FROM THE HYDROGRAPHIC BASIN VALEA PÂCLE, BUZĂU COUNTY

Radu Alexandra[1], Musat Marian[1], Stirbu Clara Claudia[2], Burcea Mariana[1]
[1] University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
[2] Valahia University of Targovişte, Romania
E-mail: stirbuclara2002@yahoo.com

Abstract
The Paclea Valley hydrographic basin situated in the hilly area of Buzau County is characterised by a great variety of environmental factors that determined the forming and evolution of a varied soil shell. Geologically, the area performs an exquisite interest due to pseudo volcanic relief known as the muddy volcanoes. The pedology survey made in the perimeter of the hydrographic basin included a number of 14 soil surveying units. The limitation of these units has been made based on the opening of main soil profiles in the characteristic points, as well as on the secondary ones and tests conducted. The dominant types of soil are colluvial erodosoils and aluviosoils resulted under the influence of the intense processes of erossion and landsliding which are presented in the area, and the respective types of soils are presented in the paper. The percentage of clay from the first 40 cm of cambic erodosoil is higher at all analysed profiles compared to the one of cambic cernosiom because they are carried to the surface by erosion, fragments of subiacent horizons with a higher content of clay. With respect to the humus content of cambic erodosoils, this is small and very small and the reaction is neutral and poor alkaline.

Keywords: soil, errosion, texture, slope, hydrographic basin

1. INTRODUCTION

The pedologic study conducted in the Pacle Valey hydrographic basin followed the general evaluation of soil resources and the presenting of a general view on productive potential of land, by pointing out the limitative factors of these, out of all the erosion being the most important.

2. MATERIAL AND METHOD

By pedologic survey, 14 units of soils framed in three classes have been limited in the field and characterized: cernisoils (zonal soils), antrisoils and protisoils. The soils presented in the present paper will be done by comparing some physical and chemical features of colluvial erodosoils and aluviosoils with those of cambic cernosioms. All data bound to the position, opening, description of profiles of soil in the field, laboratory analyses as well as the interpretation of results obtained have been made in accordance with "The methodology of pedologic studies elaboration" – I.C.P.A. 1987.[4] The pedogenetic factors that have determined the formation of soil shell can be characterized by means of: thermal regime is specific to forestry hilly area, with average yearly temperature of 9.8^0C, with moderated chilly winters but with sudden drops of temperature, yearly average precipitation of 649.9mm, non-uniform distributed on seasons, parenteral materials made of clays and loesses, grassy vegetation, in most cases due to degradation, ploughing turned into pasture, the destructive process operating further on soils. A remarkable geologic aspect met in the hydrographic basin studied are muddy volcanoes, pseudo volcanic formations unique on this continent (Figs.1,2)

Figure 1 Relief specific to muddy volcanoes

Formulas of land survey units drawn out based on the ecopedologic indexes list stipulated by the methodology in force, emphasizes the fertility limitations of the studied soils induced significantly by agricultural useful of land. [2]

Figure 2 Crater of a muddy volcano

3. RESULTS OBTAINED

The hydrographic basin of Pacla Valley was delimited in three perimeters corresponding to component sub basins, for studies. The perimeter 1 includes the hydrographic basin of Piua Valley and a part of the sides of Pacle hydrographic basin. The perimeter 2 includes Craciun's Valley hydrographic sub basin and a part of the right side of Pacle Valley. This perimeter is characterized by a treated relief; its sides being intense affected by erosion and glidings, with frequent banks breaks. The perimeter 3 includes the hydrographic basin of Zgarlici's Valley characterized by abrupt sides greatly affected by erosion.

The soil types identified by pedologic surveying made in the area are listed in Table 1. 6 profiles of erodosoil, 5 cernosiom profiles and 3 aluviosoil profiles have been depicted.

Out of the physical and chemical properties of the studied soils, the following qualities have been chosen: texture (specially the clay content below 0,002mm)[1], reaction and humus content since they are connected to the hydric erosion intensity and can give a value to that. [3] For the analysis uniformity, the data regarding the properties of erodosoils and aluviosoils will be performed, in the first 0-40cm, compared to the ones of cambic cernosiom.

Table 1. Clases and types of soil from the Paclea Valley hydrografic basin

Perimeter number	Soil type	Soils class
1	Colluvial aluviosoil 1 Cambic erodosoil 1 Cambic cernosiom 1	Protisoils Antrisoils Cernisoils
2	Cambic cernosiom 2 Cambic cernosiom 3 Cambic erodosoil 2 Cambic erodosoil 3 Cambic erodosoil 4 Colluvial aluviosoil 2	Cernisoils Antrisoils Protisoils
3	Cambic cernosiom 4 Cambic cernosiom 5 Cambic erodosoil 5 Cambic erodosoil 6 Colluvial aluviosoil 3	Cernisoils Antrisoils Protisoils

Cambic erodosoil. To characterize the cambic erodosoil, the data obtained from five profiles analyzed have been centralized so that to colligate with the ones of the cambic cernosiom.

The clay content from the first 40 cm of cambic erodosoil is higher compared with the one of cambic cernosiom, at all profiles analysed (Fig.3). in case of the profiles 2 and 3 which are situated in the second perimeter of study , the values are very similar because they have been developed on clays and loessoide clays. In this case, the erosion brings to the surface fragments of cambic horizons or even parental materials with smoother texture than that of the upper horizons of the initial profile.

For the previously mentioned ideas, it is significant the difference of about 9% of clay content of the cambic erodosoil compared to the cambic cernosiom from the third perimete, because of the strong breaking up, resulted from the erosion of the profile.

The content of humus of cambic cernosioms is middle (Fig.4), higher than the one of cambic erodosoilos analysed and considered as small and very small. The smallest value recorded is that of cambic erodosol from the two perimeter (1,19%).

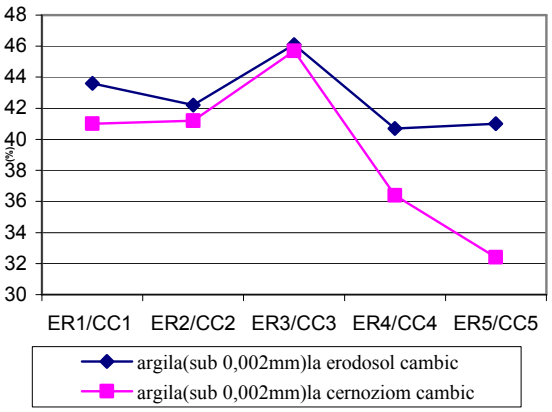

Figure 3 Clay dynamics (below 0,002 mm) in the first 40cm, at the cambic erodosol compared to the cambic cernosiom from Pacle Valley hydrographic basin, Buzau county

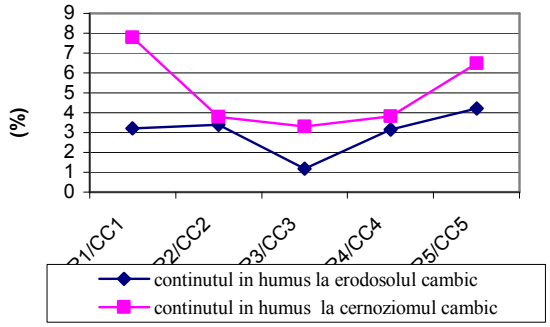

Figure 4 Humus dynamics in the first 40 cm, at the cambic erodosol compared to the cambic cernosiom from Pacle Valley hydrographic basin, Buzau county

As for the reaction of the soils analysed (Fig.5), this is neutral and poor alkaline, with close values, in most cases, higher at the cambic erodosoils compared to the cambic cernosioms analysed.

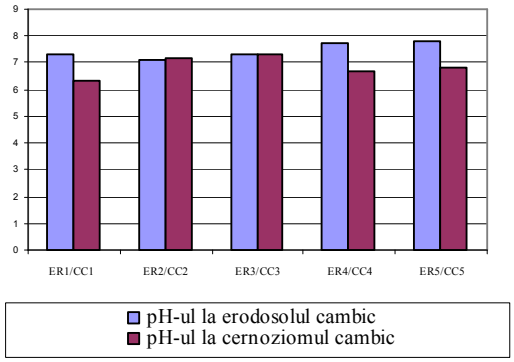

Figure 5 Dynamics of pH in the first 40 cm, at the cambic erodosoil compared to the cambic cernosiom from Pacle Valley hydrographic basin, Buzau county

Colluvial aluviosoil. Characterization of the colluvial aluviosoil has been done on three profiles, from each perimeter analysed. The results interpretation is done by comparing it with the cambic cernosiom from the studied area.

In case of colluvial aluviosoil from the first perimeter resulted by non humidifier material accumulation at the slope ground, the content of clays is about equal to the one of cambic cernosiom (Fig.6)**.** At the soils from the other perimeters the difference is significant. The texture of colluvial aluviosoils depends on the texture of mineral material carried out from the slope by erosion.

The content of humus at the colluvial aluviosoil from the first perimeter (Fig.7) is small, which justifies the above mentioned ideas. It is noted the difference of about 2% of humus content in case of the aluviosoil from the three perimeters compared to the ones of cambic cernosiom. This difference is given by the accumulation of humic material washed on the slope. The analysis can be extended also in the cambic erodosoil from the same perimeter (Fig.4), where a small content of humus is noted and, where from the intense accumulation from the slope ground results.

The reaction of colluvial aloviosoils is different compared to the one of the cambic cernosioms analysed (fig.8). If in case of the cambic cernosioms it is neutral, in case of the colluvial aluviosoils, this will be poor alkaline.

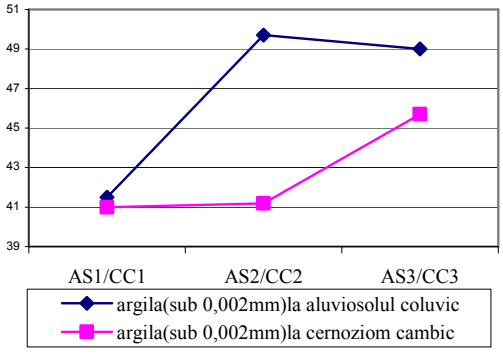

Figure 6 Clay dynamics (below 0,002mm) in the first 40cm, at the colluvial aluviosoil compared to the cambic cernosiom from Pacle Valley hydrographic basin, Buzau County

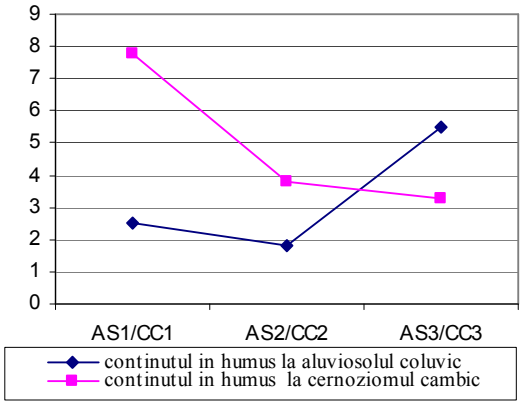

Figure 7 Humus dynamics in the first 40cm, at the colluvial aluviosoil compared to the cambic cernosiom from Pacle Valley hydrographic basin, Buzau county

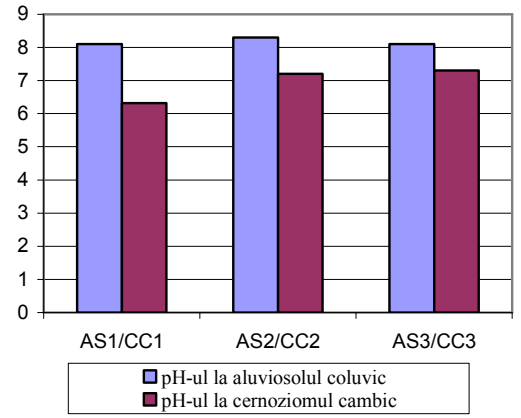

Figure 8 Dynamics of pH in the first 40cm, at the aluviosoil compared to the cambic cernosiom from Pacle Valley hydrographic basin, Buzau county

The limitative fertility factors of the cambic erodosoils and colluvial aluviosoils from Paclea valley hydrographic basin (it follows from Table 2) are: the erosion degree on surface, the colmatation degree through water respectively, the fine texture, the land slope and the landsliding**.** If the agriculture exploitation of lands continues (the present use is a pasture resulted from ploughing soils) without improvement works or a minimum protection to be ensured to soil, the destructive processes will be amplified and consequently will draw significant economical changes.

Table 2 Characterization of land units of cambic erodosoil and colluvial aluviosoil from Pacle Valley hydrographic basin, Buzau County

Crt. No.	Soil type	Survey unit formula of land
1	Cambic erodosoil	ERca k_3,d_3,e_{14},S,t,Ps/ D,U,P_{37},S.r_7,Q_7
2	Colluvial aluviosoil	AS co k_1,d_5,c_{43},SA,a,Ps/ D,U,P_{07},N,Q_6

4. CONCLUSIONS

From the above presented information, the following conclusions come out:

- The area presents a remarkable interest due to the pseudo volcanic groups known like muddy volcanoes;
- The soil types identified by pedologic survey conducted in the area are the cambic erodosoil, coluvial aluviosoil and cambic cernosiom;
- The clay percentage from the first 40cm of cambic erodosoil is higher in case of all analysed profiles compared to the one of cambic cernosiom because are brought to the surface by erosion, groups of subiacent horizons with a higher content of clay;
- The content of humus of cambic erodosoils is small and very small and the reaction is neutral poor alkaline;
- The texture of colluvial aluviosoils depends on the soils texture from the slope and on the erosion intensity; The content of humus of colluvial aluviosoils is small, the reaction is poor alkaline;
- The fertility limitative factors of cambic erodosoils and colluvial aluviosoils from the hydrographic basin are: the erosion degree on surface, colmatation degree through water, smooth texture, land slope and landsliding**.**

5. REFERENCES

1. Canarache A., *Soil physics*, Creses Publishig House, 1974
2. Ene Al., Radu Alexandra, Ştirbu Clara, Muşat M., *Land improvements, soil erosion and irrigation,* Printech Publishing House, Bucharest, 2007
3. John Boardman,Soil Erosion in Europe, Ed. Jean Poesen, 2006
4. *** Methodology of pedologic studies elaboration – I.C.P.A. Bucharest, 1987.