STUDIES ON THE SOIL COVER IN BRETEA ROMÂNĂ, HUNDOARA COUNTY, ROMANIA

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Abstract. *The Commune of Bretea Română is made up of the villages of Băţălar, Bercu, Bretea Română (seat), Bretea Streiului, Covragiu, Gânţaga, Măceu, Ocolişu Mare, Plopi, Ruşi, Vâlcelele Bune, Vâlcele, and Vâlceluţa, a territorial-administrative unit located at a latitude of 45039'N and at a longitude of 2301'E. The meadow under study is located in the Euroregion 5 West, Hunedoara County, Haţeg Depression. The average annual air temperature ranges from 5 to 6^{0}C. The average annual amount of rainfall water varies between 1,000-1,200 mm. Within the general climate, various microclimates are differentiated according to the slope, the exposition and the use of the land. The goal of this work is to gather pedological and agrochemical information on the soil cover of the locality presented in terms of its characteristics: morphological, physical and mechanical, hydro-physical, and chemical, with a view to establishing their quality in terms of productivity, as well as data on the nature and intensity of limiting factors and possible degradation phenomena, which underlie the most appropriate technological measures specific to each distinct portion of land from an ecological perspective. The object of the research is the lands located in the perimeter of the territorial administrative unit Bretea Română, Hunedoara county, respectively the types of soil identified in the respective perimeter. They were researched in relation to environmental factors, natural or modified by man, which condition their existence, together forming homogeneous ecological territory units (T.E.O.) with specific pre-suitability or favorability and different technological requirements*

Keywords*: Bretea Română, territorial-administrative, gather pedological, agrochemical information*

INTRODUCTION

The Hateg Depression (310-350 m altitude) covers an area of 6,156 ha, i.e., 61.6 km, being located at the confluence of the Râul Mare with Strei, in the contact area of the Meridional Carpathians with the Western Carpathians, being surrounded by the Șureanu Mountains in the east, the Retezat Mountains in the south, the Țarcu Mountains in the south-west, and the Poiana Ruscă Mountains in the north and north-west. [K. I. LATO ET AL., 2019]

As for the relief, the area studied belongs to 2 relief units: the mountain area and the depression area of the lower Strei.

The geological constitution, in particular the lithology of surface deposits, has made its mark on both landforms and soil cover. T

he Commune of Bretea Română is characterized by a continental temperate climate, with vertical flooring and characterized by unevenly distributed rainfall, wind blowing from the north-west, and an average temperature, in January, between -2 and -10ºC, and, in July, between 10-20ºC. [CASIANA MIHUȚ ET AL., 2012, CASIANA MIHUȚ ET AL., 2018].

The average amplitude of annual temperatures is 23ºC.

Climate research has highlighted the climate differences between valleys and slopes located at the same level, the values of the thermal indices showing that the valleys belong to a higher (colder) climate floor, which justifies the presence of herbaceous species characteristic of the upper floors at lower altitudes.

In terms of soil frost, research has shown dependence on the snow cover, altitude and nature of the land (empty or wooded). [MIHUȚ CASIANA, 2014].

The first ground frost on pastures occurs at the end of October, and the last frost at the end of March in the inter-hill depressions.

The number of days with frozen soil is higher in pastures than in forested pastures. The freezing depth of the soil decreases with altitude and is lower in forested pastures.

During the year, the average number of frost days reaches 150-160 days on the mountain peaks and 120-140 days in the depression areas and in the lanes of the Strei River.

The average duration of frost-free days is 190-200 days.

In order to achieve the proposed goal, the following objectives have been set: identification of soils and soil and land units; morphological, physical, and chemical characterization of the main soil types; establishing measures to maintain/improve the yielding potential of identified and studied land. [MIRCOV V.D. ET AL., 2016]

MATERIAL AND METHODS

In order to reach the proposed objectives, research methods specific to the pedological field were used: pedological mapping, morphological description, field expeditionary determinations, laboratory analyses, pedological information processing, etc. [ALINA-MADALINA LATO ET AL., 2016, AURELIA MIHUȚ ET AL., 2018].

The profiles were placed in representative places of the research area so that the most representative soil types and subtypes can be described.

In the case of profiles, samples were collected on soil genesis horizons, both in natural (unmodified) and modified settlement. [NIȚĂ LUCIAN-DUMITRU, 2007, L NIȚĂ ET AL.,2018, LUCIAN NITA ET AL., 2019].

The collection of soil samples in natural settlement (unchanged), for the characterization of certain physical and hydrophysical characteristics was done in metal cylinders of known volume, at the momentary humidity of the soil and in cardboard boxes (specially made) for its micromorphological characterization. [DUMA-COPCEA, A., ET AL., 2013, DUMA-COPCEA, A. ET AL., 2019].

The collection of samples in modified settlement, for physical, chemical, and partially biological characterization, was carried out in bags, on each genetic horizon. Agrochemical samples (from the processed layer) were also collected for the determination of specific chemical indices.

Analyses and other determinations were carried out in the laboratories of the Office for Pedological and Agrochemical Studies Arad, Arad County, the Institute of Pedological and [ADALBERT OKROS ET AL., 2018, OKROS A. ET AL., 2014, OKROS ADALBERT, 2015].

Agrochemical Research in Bucharest, as well as of the University of Agricultural Sciences and Veterinary Medicine of Banat in Timisoara, Timis County, according to national norms and standards approved by the Romanian Standardization Association (A.S.R.O.).

RESULTS AND DISCUSSIONS

CLASS PROTISOLS. It includes unevolved or incompletely developed soils, which generally have only a higher horizon (poorly contoured) followed by parental material.

From this class, two types of soils were studied: regosol and alluviosol.

Regosols are defined by horizon A, developed on unconsolidated or poorly consolidated parental material with the exception of sandy, fluvial, or anthropogenic parental materials.

It has no other diagnostic horizons or properties.

The early stage of soil formation is determined by the hardness of the mother rock (non-carbonated sandstones, carbonate sandstones, shales) and strong surface erosion.

Regosols were found in the area studied on slopes and peaks. Within this type of soil, five soil subtypes were delineated:

Dystric regosol. This soil has dystric properties (saturation level in bases less than 53% or between 53 and 60% if associated with extractable Al over 2 me per 100 g/soil) at least in the surface horizon. Soil profile is of the type At - Ao – AC – C – CR – R.

Dystric lithic regosol. This soil has dystric properties (saturation level in bases less than 53% or between 53 and 60% if associated with extractable Al over 2 me per 100 g/soil) at least in the surface horizon; it shows hard rock within the first 50 cm of the soil profile.

Eutric lithic regosol. This soil has eutric properties at least in the surface horizon (saturation level in bases > 53%), it does not exhibit carbonates and presents hard rock in the first 50 cm of the soil profile. The soil profile is of the type At – Ao – A/C – C – CR – R.

Eutric regosol. It has eutric properties at least in the surface horizon (saturation level in bases > 53%), and it does not exhibit carbonates.

The soil profile is of the type At – Ao – A/C – C – CR – R.

Limestone regosol. It is characterized by the presence of carbonates on the surface or in the first 50 cm (effervescence when adding HCl 1:3).

The soil profile is of the type At - Aok – A/Ck – Ck –CRk – R.

Alluviosols are characterised by the presence of the Ao horizon whose thickness exceeds 20 cm, followed by parental material over at least 50 cm, represented by river deposits (river stones and sands).

The soil genesis process is dependent on the form of microrelief, the position within the mountain, and the age of the deposits.

Soils located in the immediate vicinity of the riverbed are frequently affected by floods that interrupt the soil genesis process.

Within this type of soil, the following subtypes were delineated:

Entic alluviosol. This soil is characterized by the presence of an Ao horizon below 20 cm or by its absence, followed by fluvial parental material (river stones).

The soil profile is of the type Atk – Ao – ACk – Ck – Cgk.

Eutric alluviosol. This soil is defined by the presence of the Ao horizon, whose thickness exceeds 20 cm, followed by parental material (river deposits, river gravels). The soil has eutric properties at least in the surface horizon (saturation in bases > 53%), and it does not exhibit carbonates.

The soil profile is of the type At – Ao – A/C – C1 – C2 – CR – R.

Gleyic alluviosol. This soil is defined by the presence of the Gr horizon in the 50-100 cm of the soil profile. The gleyic subtype is determined by the presence of the groundwater at shallow depth.

The soil profile is of the type At – Ao – AC – Cg – CGox.

Colluvic alluviosol. This soil is defined by the presence of non-humous colluvial fluvial parental material accumulated in a layer more than 50 cm thick, on the slopes or at the base of the slopes.

The US-level delimitation was made according to the surface texture and control section, the presence of fossil soil, the skeletal content, and the composition of the parental material. The soil profile is of the type At – Ao – Ao' – AC – C.

Entic-lithic alluviosol. This soil is characterized by the presence of an Ao horizon below 20 cm or by its absence, followed by fluvial parental material (river stones) and by the presence of hard rock in the first 50 cm of the soil profile.

The soil profile is of the type At – Ao – AC – C – CR – R.

Colluvic calcareous alluviosol. This soil is defined by the presence of carbonates on the surface or at the base of horizon A but not more than 50 cm and by the presence of non-humous colluvial fluvic parental material accumulated in a layer more than 50 cm thick, on the slopes or at the base of the slopes.

The soil profile is of the type Atk – Aok – Aok' – ACk – Ck.

CLASS LUVISOLS. The class comprises soils with diagnostic horizons, the Horizon Bt (argic) enriched in clay, migrated from the upper horizons.

The soil types studied in this class are luvosols. *Luvosols* comprise soils with horizon A ochric (Ao) followed by eluvial horizon E (E1 or Ea) and horizon B argic (Bt) with a base saturation (V %) 53% at least in an upper sub-horizon.

The following subtypes were highlighted in this type:

Typical Luvosol. It represents the central concept of the soil type, and it does not exhibit the specific attributes of the other subdivisions of the soil type.

The soil profile is of the type At – E1 – E/Bt – Bt1 – Bt2w.

Albic Luvosol. It is characterized by the presence of the albic eluvial horizon (Ea) of at least 10 cm. This subtype is found in the slopes.

The soil profile is of the type Ate1 – Ea – E/Bt – Bt1 – Bt2w.

Stagnic luvosol. It is characterized by the presence of hypostagnic properties (horizon W) in the first 100 cm of the soil profile.

This subtype is found on the slopes (depression areas).

The US-level delimitation was made according to texture, degree of stagnogleization, particular melanic cumylic characteristics, composition of parental material and degree of erosion.

The soil profile is of the type Ate1 – E1(w) – E/Btw – Bt1w – Bt2w.

CLASS SPODISOLS. It includes soils with an ochric or umbric horizon (Ao, Au) followed by a spodic horizon feriiluvial (Bs) or an intense humic cryptospodic B horizon (Bcp).

They may have a discontinuous spodic eluvial horizon (Es) and may have an organic horizon. Within this class, only one type of soil was delineated:

Podzol. It comprises soils with horizon A ochric or umbric (Ao, Au) followed either by a feriilluvial Spodic Horizon (Bs) and a spodic humic – feriiluvial horizon (Bhs) or Feriilluvial (Bs). Two subtypes were found in this type of soil:

Umbric podzol. It is characterized by the presence of a shadow horizon.

The soil profile is of the type At – Au – A/Bs – Bs – BR – R.

Umbric lithic podzol. It is characterized by the presence of a shadow horizon (black) and by the presence of hard rock in the first 50 cm of the soil profile.

The soil profile is of the type At – Au – A/Bsq – Bsq – BR – R.

CONCLUSIONS

Within the perimeter searched on the basis of data in the local town hall archive and those recently obtained by direct observation in the field and processed in the laboratory 36 units of land (UT-TEO) were delineated, represented graphically on a plane at the scale 1:100,000 and 1:200,000, respectively, in this article.

Of the total area of 1,693.71 ha of soils in the studied perimeter, the soils with the greatest distribution were studied:

-*luvosol*, with an area of 626.26 ha (36.98%);

-*podzol*, with an area of 568.63 (33.57);

-*alluviosol*, with an area of 121.69 ha (7.18%);

-*regosol*, with an area of 120.55 ha (7.12%).

Genetically, the soils delineated in the studied perimeter belong to the following classes:

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