DESCRIPTION OF THE SOILS WITH THE HIGHEST PERCENTAGE FROM THE GIARMATA LOCALITY OF THE TIMIȘ COUNTY

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Abstract

The purpose of this paper is to describe the physical and chemical soil with the vast share of the investigated area . It is essential to know the physical-chemical soil properties, since they provide information on the soil quality, thus enabling people to establish strategies for its most efficient usage or exploitation. ***Preluvosoil*** *occupies an area of 3578.16 ha , 56.86 % . The physical and chemical characteristics of the investigated area preluvisols , has many differences compared to the parent rock in which they were formed.* ***Eutricambic soils*** *occupies an area of 795.43 ha , 12.64%. Eutricambic soils are characterized by a well developed soil profile, but only slightly differentiated from a textural and morphologic point of view.Vertosoils occupies an area of 454.64 ha Giarmata , 7.23 %.* ***Vertisols*** *in the investigated area are found in various stages of gleyzation.* ***Gley soils*** *occupies an area of 242.88 ha . These soils were formed mainly by fluvial deposits weak still and carbonated.* ***Alluvosoils*** *occupies an area of 88.66 ha (1.41 %) , neinudabile encountered along river banks or rarely flood. The evolution stage varies with different bioclimatic areas, or within the same bioclimatic area, in transversal section, from the minor waterbed to the terrace connection. The soil is considered the basic natural resource of every efficient, productive and sustainable agricultural system, simultaneously being limited and more complex than air and water, representing the essential life support. In time, the concept about soil and its functions has evolved. Soil properties can evolve over time under the climatic, biologic and anthropic factors.*

Keywords: *soil, agriculture, forestry, agricultural products*

INTRODUCTION

In order to characterize the climate conditions, climatic data registered and interpreted at the Agrometeorology discipline, from the Faculty of Agriculture were used. The climate is of a moderate continental climate, with warm summers and mild winters due to the oceanic air masses (from the west) and Mediterranean (from S and SV). The Giarmata commune is situated on the south-eastern end of the Vinga plain, with a general north-east towards south-west orientation. The Vinga Plain has average altitudes ranging from 100 to 150 m, very broad interfluve, sprinkled with depressionary areas, a slight fragmentation and even more reduced relief energy.

MATERIAL AND METHOD

The soil properties bear a great importance in a many human activities, such as agriculture, forestry, geo-technique, environmental protection, archaeology. Soil research for practical application provides rapid information on important soil properties, such as: texture, skeleton, useful edaphic volume, humus content, reaction etc. Traditional soil research methods are expensive and time consuming, because it needs sample harvesting through disturbing the soil, transport, storage and laboratory chemical analyses, but they are also certain. The soil is considered the basic natural resource of every efficient, productive and sustainable agricultural system, simultaneously being limited and more complex than air and water, representing the essential life support. In time, the concept about soil and its functions has evolved. Soil properties can evolve over time under the climatic, biologic and anthropic factors.

RESULTS AND DISCUSSION

The soil is a dynamic entity that is it represents life. The complex changes taking place are highlighted by numerous processes which are continually changing, until a certain relatively stable balance is reached. **Typical preluvosoil, slightly weatherworn by water, on medium fine clay, medium clayey/medium clayey**. The **preluvosoil** evolution process took place with an intensity dictated by the bioclimatic area, by the relief form age, its aspect, and the nature and origin or soil formation. This soil occupies a surface of 3,578.16 ha, 56.86%. **Characterization**. The vast majority of preluvosoils are automorphic, identified in piedmont areas with a phreatic level under 10 m depth or terraced, with a phreatic level between 5 and 10 m. Reduced areals zare encountered on low terraces, at the transition from high to low plains, or in low plains on gradual/grinded relief forms, with a phreatic level situated at a 3-5 m depth, and in depression areas, with a phreatic level between 2 and 3 m. The Giarmata preluvosoil physical-chemical characteristics present numerous differentiations in relation with the parental stone on which they were formed. On the surface (0-20 cm horizon), the texture is medium-fine (clayey-argil), in depth it is predominantly medium-fine (clayey-argil) or fine (argil-clayey). The compactness state of these soils varies, becoming pronounced on the profile starting from A/B; the apparent density is 1.20-1.35 g/cm^3 in the A horizon and 1.40-1.65 g/cm^3 in Bt. Giarmata preluvosoil subtypes: typical preluvosoil, vertic preluvosoil, batigley preluvosoil, stagnic preluvosoil, molic-batigley preluvosoil, vertic-stagnic preluvosoil. There is a medium total porosity in the A horizon, rapidly decreasing on the profile, becoming low on Bt. The same decreasing tendencies and directions are displayed by the aeration porosity, which is satisfactory in the A horizon (10-15%) and non-optimal (4-7%) in the B horizon. The same variations can be observed in the water permeability, the hydraulic conductivity decreasing from ca 450.10^{-6} cm/s in A to 10.10^{-6} cm/s in B. The hydrophysical indices (on the useful agricultural plant section = 0-50 cm) are different, depending on the texture. With the preluvosoil majority (those with medium-fine texture, those formed on swelling argil or those formed on argil resulting from limestone alteration processes), the withering coefficient varies between 10-13%, the field capacity between 23-26%, the total water capacity between 20-25%, and the total useful water capacity between 10-14%. The chemical characteristics are a lot more differentiated, depending on the area where they have been identified. The A horizon contains between 1 and 3% humus, between 0.110-0.200% total nitrogen, the C:N relation presents values ranging from 11 to 13. The mobile phosphorus content of these soils is average (20-40 ppm), and the potassium is variable, depending on the soil formation material, higher in soils evolving on argil (especially on smectitic ones) and more reduced on sols evolving on deluvial, proluvial materials, with more coarse textures. The cat-ionic exchange capacity (T) varies depending on the nature and quantity of argil in the soil: 20-37 me/100 g soil, on carbonated soil and materials resulting from limestone alteration and 35-55 me/100 g soil, on argil. The alkali saturation level is constant on the profile and oscillates between 70 and 95%, ant the reaction is slightly acidic (pH=6.2-6.8). **Stagnic gley eutricambic soil, on coarse fluvial deposits, sandy-clayey/clayey-sandy**. **Eutricambic soils** are, in general, relatively young or rejuvenated soils, in various dealkalization stages (without their alkali saturation level decreasing to below 53%). They depend on the soil formation rock or the bioclimatic condition conjuncture. These are soils evolving only on alkali rich rocks (argil, marl). They cover a 795.43 ha surface, 12.64%. **Characterization**. Eutricambic soils are characterized by a well developed soil profile, but only slightly differentiated from a textural and morphologic point of view. They are very different from the point of view of their granulometric constituency and, usually, one may either observe an obvious vertical stratification of the soil formation material, or not. Giarmata eutricambic soil subtypes: typical eutricambic soil, batigley eutricambic soil, stagnic eutricambic soil, stagnic gley eutricambic soil. The total cat-ionic exchange capacity varies a lot, depending on the argil nature, but, generally, it is more reduced (under 10 me/100g soil). The alkali saturation level is high in the A horizon (50-85%), gradually decreasing in depth, in the same direction as the pH, from 6.8-6.0 to 5.8-5.1. The higher values of the chemical characteristics of the A horizon reflect an intense bioaccumulation despite the initial rock being poor in alkali and nutritional elements. Along with the active aeration process, under the impulse of specific climatic conditions, the alteration is much more active than in similar altimetric areas in the country, with argil formation due to silicates in the rock. The rock disaggregation and alteration products are frequently moved on the slopes, towards their base, gravitationally or by waters, a fact that explains the coating deposit polistratification. **Stagnic vertosol , on medium-fine swelling materials.** The soils in this class cover in Giarmata a 454.64 ha surface, 7.23 % of the studied areal. They are divided in several subtypes depending on the water excess and the water form excessively affecting the soils. **Characterization**. From the predominant pedogenetic, important are the ones referring to the parental material, with fine and medium-fine granulometric constituency and mineral composition where expendable, smectitic minerals excel. In river and rivulet everglades, coming out from the piedmont area, vertosoils evolved on medium-fine and fine fluvial deposits and under the influence of the high phreatic level (0.5-3 m). In these cases, vertosoils can be found in various gley formation stages. Giarmata vertosoils subtypes: typical vertosoil, batigley vertosoil, stagnic vertosoil. The formation of these soils is conditioned by the presence of a argil parental material, with expandable characters and climate with pluviometric and thermal oscillations. During the warm and dry period, the upper horizons quickly loose water (especially through evaporation), including that in crystalline networks which decrease their volume considerably. The soil bursts in great depths. In the created holes, through water, wind and anthropic interventions, earthy material is accumulating, a fact which partially explains the high thickness of bioaccumulative horizons. In periods with excessive pluvial humidity, the soil gets wet upwards through rapid water drainage in anterior achieved fissures; argil particles get hydrated, and argil minerals accept water in their crystalline network and increase their volume. If normal space is lacking, pressure is formed in the soil. The pressure increases simultaneously with the quantities of allochthonous earthy materials, a fact that leads to the structural aggregate tilt (gliding), to horizon mixing and expansion towards the land surface, where land unevenness appears (holes, gilgais). The microstructural aspect of vertosoils results predominantly from fissuration, the presence of argil-humus creases and neo-creases on fissure walls, and the varied argil-humus plasma distribution on the profile certifies the polyphasic genesis of vertosoils.

Proxigley gley soil, slightly levigated, on bi-stratifications, clayey-argil/ clayey-argil. **Gley soils** were predominantly formed on non- carbonic or slightly carbonic fluvial deposits, often layered, in relief conditions characterized by a defective external drainage, under the influence of a high phreatic level. In the researched area, this type of soil covers a 242.88 ha surface, representing 3.86% of the tillable total. Giarmata gley soil subtypes: typical gley soil, vertic gley soil, cambic gley soil, proxy-gley gley soil. Evolving on fluvial deposits of heterogeneous origin, with various granulometries (coarse, medium, medium fine and fine), gley soils observe relatively homogenous textures on the profile: sandy-clayey, clayey, clayey-argil and argil-clayey. The physical and hydrophysical characteristics largely vary, depending on the granulometric constituency of the soil profile, generally, they are less favourable than in the case of zonal soils with similar textures. The soils are moderately supplied with humus and total nitrogen in the upper horizons, and then it decreases rapidly, in depth. The humus deposit is average (120-180 t/ha), higher with molic subtypes and more reduced with the cambic ones. The C:N relation is around 15. The cat-ionic exchange capacity, the alkali saturation level, and the reaction also vary depending on the fluvial deposit nature which originated these soils. **Batigley colluvic alluvosoil, on medium fluvial deposit, clayey-dusty/clayey-sandy. Alluvosoils** are observed in non-floodable or rarely floodable river everglades. In the studied area they cover an 88.66 ha surface (1.41 %). **Characterization**. The Alluvosoil soil formation material, represented by fluvial deposits, is characterized by an accentuated non-homogeneity, on the profile, as well as in the space. On a vertical plane, on the profile, the granulometric characteristics are determined by the flood water debit and speed. Through mapping, several parental materials have been identified, with various granulometric compositions: coarse, medium, medium-fine and fine. The coarse and medium fluvial deposits met in the immediate proximity of the major waterbeds, on grinds or at the change in the river course. The fine ones were identified at the contact with the terraces or, isolated, in depression areas. The parental material and resulting soil mineralogy is defined by the mineralogical characteristics of the river hydrograph basin soils and rocks. In this context, one may observe that the local river everglade alluvosoils or of those with an extended hydrograph perimeter present increased heavy metal loads (Cd, Pb, Cr, Zn, Ni, Co, Mo), elements originating from the mountainous massive metallic-genetic areals of the Poiana Ruscă Mountains. Giarmata alluvosoil subtypes: typical alluvosoil, lithic alluvosoil, batigley alluvosoil, batigley molic alluvosoil, stagnic gley colluvic alluvosoil Alluvosoils were formed under periodic repetition conditions (at rare intervals) of the flooding-alluvionation process. These interrupt the soil formation processes and lead towards a soil profile raising, the old situations remaining relict. The evolution stage varies with different bioclimatic areas, or within the same bioclimatic area, in transversal section, from the minor waterbed to the terrace connection. In the low plain, under the influence of a warm and droughty climate and rich grassy vegetation, alluvosoils present a well expressed bioaccumulative horizon, encountered at the transition to chernozem type local soils. In the same areas, in the major everglades of the main water courses, alluvosoils can be encountered in various evolution stages in relation to microrelief forms specific to everglades or in relation to the alluvial deposit nature. The most pedogenetically advanced soils are situated on grinds and formed on medium to fine parental materials, alkali rich, and the less evolved ones are the soils encountered in depression areas, frequently covered with flood water or intensely affected on a high pedophreatic level. The slow pedophreatic water circulation and their increased mineralization, on the background of a exudative hydric regime, facilitates the accumulation on the profile of soluble salts or the penetration of the colloidal complex by the sodium ion.

CONCLUSIONS

The maintenance and improvement of the soil fertility level is a major preoccupation of all countries, necessary for the insurance of the continuously growing population food necessity. Preserving and maintaining the natural soil fertility was and still is supported and promoted by researchers and experts, given the current demands in developing a sustainable agriculture. In the context of sustainable agriculture, soil protection, preservation and creating a favourable environment for crop plant development, should be based on knowing the soil's physical state, aside from its chemical and biological one. In our country, as well as on international level, research in the soil physics field were long kept on the level of empiric techniques, only later on attracting the scientific research attention. As an interface between earth, air and water, the soil is a very slowly renewable resource, which fulfils many vital functions, such as: food production; some substance transforming, filtering and depositing; source of biodiversity, habitats, species and genes; it serves as physical platform/environment for people and human activities; it is a raw material source; it represents a geologic and archaeological patrimony. In a modern and efficient agriculture, the soil represents the main production means which, if used rationally, insures qualitative and economically profitable agricultural products.

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