Scientific Papers. Series A. Agronomy, Vol. LVIII, 2015
ISSN 2285-5785; ISSN CD-ROM 2285-5793; ISSN Online 2285-5807; ISSN-L 2285-5785

CONTRIBUTIONS TO THE KNOWLEDGE OF SOILS FROM THE PITEŞTI PLAIN FOR SUSTAINABLE USE

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Abstract

The study is located in the South of the country, in the of Pitesti Plain, a subunit of Teleorman Plain, in turn a subdivision of the Romanian Plain.
In terms of geological composition of the territory studied are prevalent proluvial deposits (upper Pleistocene), followed by gravels, sands and sandy clays (upper and lower Pleistocene).
Under the influence of pedogenetic factors and processes within the Pitesti Plain was formed by a wide range of soils, belonging to the classes: protisols, cambisols, luvisols, vertisols and hidrisols.
Within the territory of Pitesti Plain land suitability is partially limited by certain factors such as compaction, stagnogleyzation, gleyzation, erosion and danger inundability.
Knowing all parameters (morphological, physical and chemical) soils, modern approach to agricultural technologies and empowering all stakeholders have the effect of both correct and sustainable exploitation of the natural resources and preserve and improve the quality of the main means of production feed people.

Key words*: sustainable use, Pitesti Plain, pedogenetic processes, soils, improvement requirements.*

INTRODUCTION

This paper aims to characterize soils in Pitesti Plain sustainable use. It was developed based on field studies and documentation specialist. To perform the work, really useful we have been given and studies of geology, geomorphology and pedology undertaken territory Gr. Posea, M. Parichi et al., M. Iancu and I. Rădulescu.
The character piedmont, passing gradually into the Câlniştei Plain through the Dâmbovnic Plain. It consists of a series of terraces (7) of Argeş fan whose development south up to 8-10 km wide (in the locality Broşteni).

MATERIALS AND METHODS

In this case was applied the ICPA methodology which included a rich land (50%) and laboratory (40%), which consisted in exploration the ground cover in large and medium scale, using soil profiles in a network of points with respect to the geological, geomorphologic composition of planning, its hydrography, hydrology and hydrogeology. In the Piteşti Plain were open a huge number of profiles (hundreds or even thousands at the major relief units) who studied the number and the thickness of horizons, color, texture, structure, moisture, consistency, plasticity, compactness, adhesion, porosity, degree of gleyzation or stagnogleyzation, soil storage condition, etc. To characterize the physical, chemical and hydro were collected numerous soil samples unmodified and modified settlement on which were performed the determinations in the laboratory.

RESULTS AND DISCUSSIONS

Being placed in great relief unit of the Romanian Plain, Piedmont Piteşti Plain the same geological character, emphasizing local and specific issues. From the geologic is formed at the surface of deposits belonging almost exclusively Quaternary (Figure 1). Quaternary largely consists of gravels, sands and clays based, the so-called strategy of Frăteşti, over following a marl and clay, then sand (for Mostiştea), gravel (Colentina) and loess-like deposits.

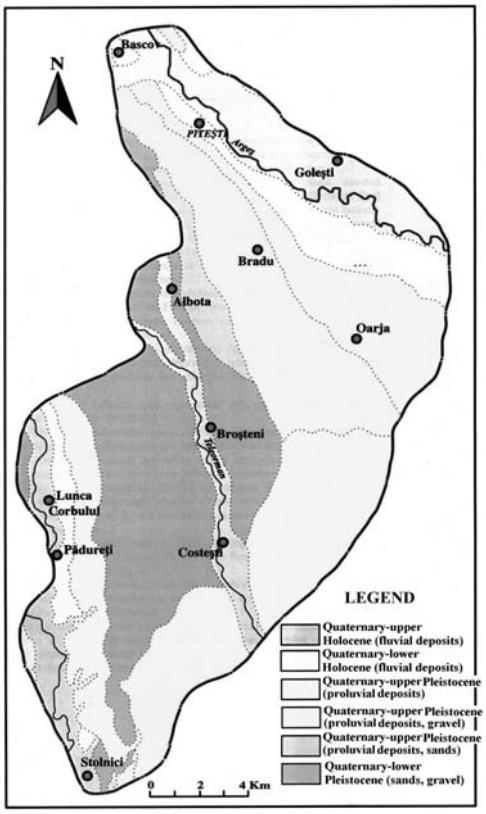

Figure 1. Geological map of the Piteşti Plain (after I.G.)

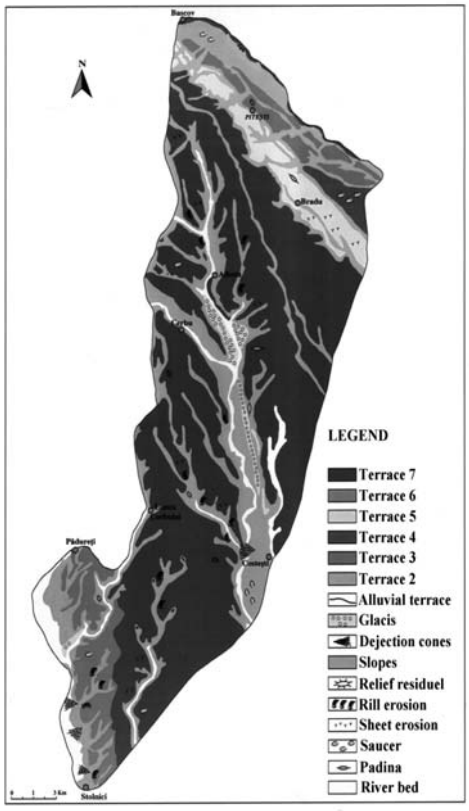

Figure 2. Relief map of the Piteşti Plain

Regarding genetic types of Quaternary deposits have the greatest development deluvial deposits - proluvial covering all fields and terraces. Fluvial deposits are located in the valleys and meadows.

Of the sediments that make up the Holocene and Pleistocene age upper and lower of the Piteşti Plain, important for the genesis and development of soil cover are those of the terraces Argeş. Clays predominate found over a large area in the center of the territory studied.

As apparent from the relief map of Piteşti Plain studied region, presents itself as several easy steps descending, NS direction. The Argeş Valley, from south of the terraces is conducted Bascov fan (Figure 2).

Fragmentation is high relief, Argeş and Teleormanul is currently the only major valleys that cross the plain wording. It would also add Cotmeana River in the S, SV. This emerges clearly meadow and terraces Argeş and Teleorman Valley. As microrelief elements can river bed, glacis, dejection cones, slopes, relief residuel, rill erosion, sheet erosion, saucers and padina.

Argeşul which originally flowed from North to South, about the current route of the river Vedea went first Câlniştei route and in an earlier stage Neajlov route, reaching only later to form the current bed. Reconstitution of this process could be carried out on the basis of the six fan-shaped terraces exist only on the Argeş River right in the area of Piteşti, Argeşul left them behind him, one by one, as the journey to the East (Figure 3).

Figure 3. Cheer terrace IV of Argeş River South of Piteşti

Teleormanul is a river that has its origin in Piedmont Cotmeana, which headed south, deep into powerful only a few kilometers from the springs. Throughout the piedmont present only on the left side terraces and the entry into plain on both sides (Figure 4).

Figure 4. Shore erosion Teleormanului Valley

The complexity of the interaction factors (physical geography), as well and pedogenetic processes is reflected in the diversity of soil cover sensitive. As pedogenetic processes that contributed to the formation and development are mentioned: clay migration, argillisation, gleyzation, stagnogleyzation, processes vertices and erosion (Figure 5).

Clay migration, stagnogleyzation we encounter almost everywhere in the study, with the formation of a wide range of soils, from luvisols and ending with vertisols.

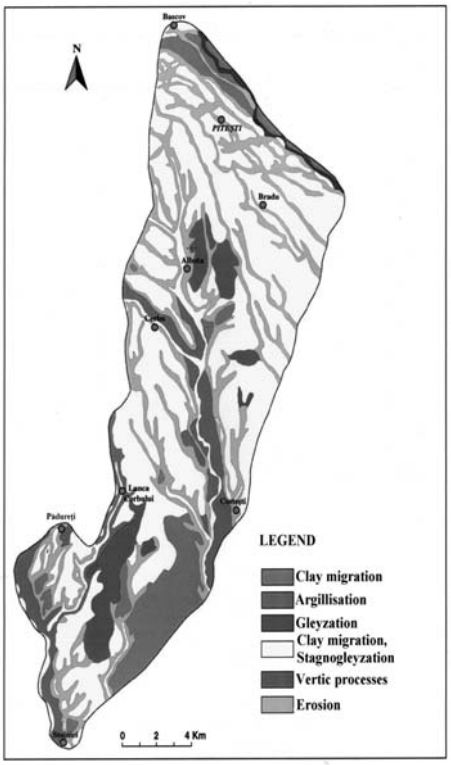

Figure 5. Piteşti Plain. Map of pedogenetic processes

Pedogenetic process argillisation is present in all soils formation of the territory, the characteristic alluviosols.

Gleyzation permanently or periodically due to excess water in the soil, met at gleiosols.

Processes vertices are characteristic clay rich soils, which are able to swell.

Erosion although not yet pedogenetic process interrupts soil formation or favors.

Under the influence of pedogenetic factors and processes within the territory of Pitesti Plain formed a wide range of soils from classes: protisols, cambisols, luvisols, vertisols and hidrisols.

Protisols have the diagnostic horizon A, followed by material or parent rock. They consist of the following types: regosols and aluviosols (Figure 6).

Regosols. Soils having a horizon A has developed on parental material unconsolidated or poorly consolidated, kept close to the surface by erosion geological difficulties. They met in Argeş and Bascov.

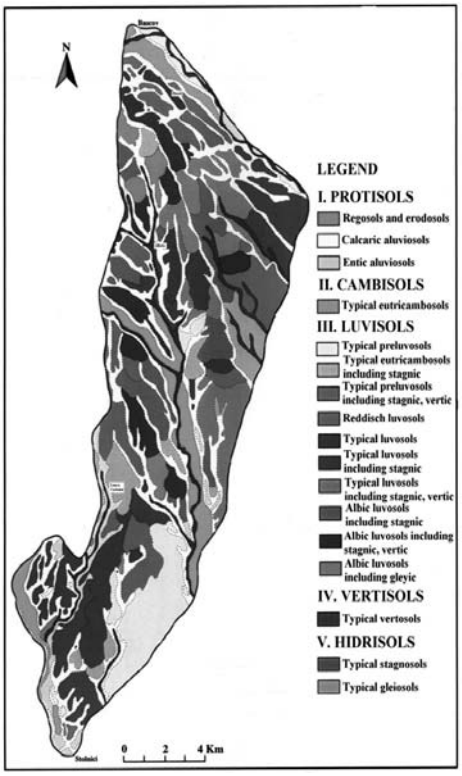

Figure 6. Soils map of the Piteşti Plain (after I.C.P.A)

Presents a profile of the type *Ao - AC - C*. Among soils with low natural fertility due to low content of humus and nutrients poverty.

Alluviosols are young soils related forms of relief, such as meadows. They were formed on account of the most recent deposits of water courses. Average thickness of these materials varies from 1-2 m 5-10 m. We meet on the Argeş Valley and Teleormanului being represented by enthice and calcarice subtypes.

It is characterized by a poorly differentiated profile of type *Ao - AC - C*. They range in texture from sandy to clay, sometimes contrasting (the middle coarse, fine on rough, etc.). Humus content rarely exceeds 1.5% in Ao horizon and decreases sharply at the horizon C. The degree of base saturation shows high values (95-99%).

The supply of nutrients is poor nitrogen (0.069 to 0.090), medium phosphorus (13.5 to 20.0) and total potassium poor (45-80 ppm).

Cambisols

Group soils that essential diagnostic element is the presence profile cambic B horizon (Bv), represented by typical eutricambosols. These soils we encounter on the terrace of the valleys I Argeş and Teleorman. Parent material consists of clay loams and sandy gravel frequently. *Typical eutricambosols* presents a profile of the type *Ao - AB - Bv - C*, moderately deep. They contain about 35-40% clay in the upper horizon and not more than 45% in Bv horizon. The reaction of these soils is moderately weak acid, humus content ranging from 2 to 4%. From a biological active and relatively well supplied with nutrients.

Luvisols

Luvisols class includes those soils which have diagnostic argic B horizon (Bt) enriched in clay migrated, morphologically recognizable by the presence of clay particles coating the surface structural elements. They may or may not eluvial horizon (El or Ea). They are represented by preluvosols and luvosols.

Preluvosols are represented by the typical and stagnice subtypes.

Typical preluvosols appear in the Pitesti Plain on the terraces VI and VII. Parent material consists of clays, clay loams and loams. Typical preluvosols are characterized by a profile type: *Ao – Bt - C* or *Cca.* The surface texture is loamy (30-31% clay under 0,002 mm) and clayish on profile (33-42%). Contain humus in small amounts, and the degree of base saturation (75-80%) fall into the category of eubasic these soils.

In terms of supply of nutrients and microbiological activity, typical preluvosols has a relatively good situation.

Luvosols occur in the studied in a variety of subtypes: typical, reddish, stagnated, albic and gley. *Typical luvosols* have found a large area of terraces of II, III, IV, V, VI and VII (Figure 7). Parental material is represented by loams or clay loams with more coarse material - quartz sand and gravel small.

It has the following sequence of horizons: *Ao - El - EB - Bt - C.* Have a differentiated texture profile from sandy loamy to clay loamy. The reaction of these soils is generally acid, higher values occur in Ao (5.8 to 6.2), which fall in the horizon El (5.4 to 5.7). The degree of base saturation of 60-78% of these soils is in the category of mesobasic.

The supply of nutrients and microbiological activity is generally unsatisfactory.

Figure 7. Typical luvosols on the terrace IV of the Argeş

Albic luvosols are found in central and northern Piteşti Plain terraces II, III, IV, V, VI and VII. Parental material is clay loam the contents terraces. Albic luvosols has the following sequence of horizons: *Ao - Ea - EB - Bt-C*. Compared to the typical luvosols, shows a more pronounced textural differentiation, thus the content of clay in the Bt horizon (52.7%) doubling the face of Ao (28.1%).

These soils are categorized soils with low fertility, and this because of physical, chemical and trophic less favorable. They have a less good structure, low humus and nutrient supply inadequate.

Vertisols is represented in the territory covered by *typical vertosols*. Appear spread out to the south of the Lunca Corbului locality and near Albota locality, on the terrace of VII.

Parent material consists of fine textures sediments containing at least 50% clay under 0.002 mm. The morphology typical vertosols type *Az - Bzy - Cz or C*. The texture is clay content is relatively uniform throughout the entire depth of the soil profile (72-74%). Have low permeability to air and water and a water reservoir sometimes very high, but that is inaccessible to plants.

Hidrisols

In this class were included soils were formed and evolve under conditions of excess moisture, periodic or permanent water comes from groundwater, precipitation, leaked on the slopes, streams and coastal horizon as a diagnostic character Gr or W.

In Piteşti Plain are represented by typical stagnosols and typical gleiosols.

Typical stagnosols occupy small areas north of localities Broşteni and Albota. Parent material consists of fine sediment texture, permeable hard proluvial home, usually free of carbonates (clays, clay loams, loess-like deposits).

It is characterized by a profile type *Aow - AoW - BW - C*. It has a texture clay loam-clay containing up to 53% clay in the Bt horizon. Humus content is low, ranging from 1.8 to 2.3% in the upper horizon.

Natural fertility stagnosols is generally low.

Typical gleiosols have a very small spread in the territory north of Costesti. Parent material consists of various sediments of alluvial-proluvial nature, alluvial and deluvial generally poor or no carbonate.

Presents a profile of type *Ao - AGox-Gr*. Soil reaction can vary from weak to strong acid (pH 5.0 to 6.5) and humus content is relatively low (2.0 to 3.0% in Ao). Are poorly biologically active due to excess moisture.

Within the territory of Piteşti Plain land pretability is partially limited by factors such as compaction, gleyzation, stagnogleyzation, erosion and danger inundation. Given the nature and intensity of restrictive factors have particularly following categories of land (Figure 8):

Class I. Lands with very good pretability for of field crops without any restriction we encounter on the terrace I of the Teleorman and Argeş River.

Class II. Lands with good pretability reduced limitations due to compaction, stagnogleyzation and danger inundation have a spreading in large territory especially on the terrace VII.

Class III. Lands pretability middle with moderate limitations that reduce soil acidity range of crops due, stagnogleyzation and low nutrient supply has a relatively large spread from terrace II and ending with terrace VII.

Class IV. Lands with poor pretability severe limitations that determine appreciable reduction in yields due stagnogleyzation field crops and erosion, they encounter very little territory south of the Bradu locality and close to the Smeura locality.

Knowing in detail the potential of the natural environment factors regarded separately and integrated complementarismul man can consciously intervene in recouping pretability native land and its optimization by means of modern farming.

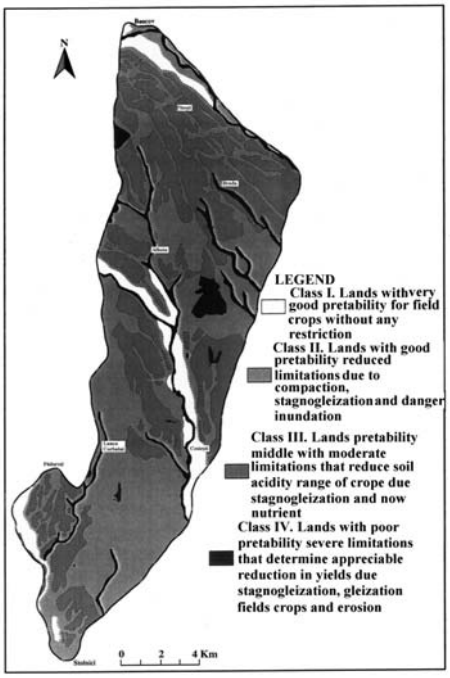

Figure 8. Piteşti Plain. Grouping map arable land after pretability

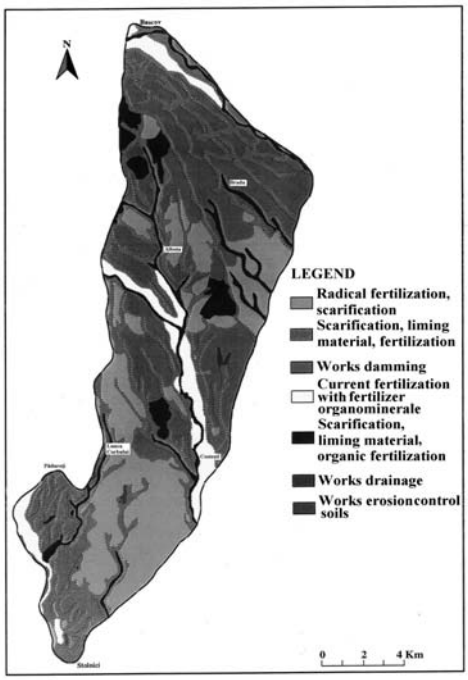

Figure 9. Piteşti Plain. Agropedoameliorative map requirements

As is natural limiting factors of agricultural production shall be lodged in natural elements of the sub-frame, namely the conditions of relief and stagnation of soil erosion and the danger of flooding.

To all these human activity embodied in applying an poor agrotechnical (mechanical work performed on soils with high humidity, chemical fertilizer mainly acidic differentiated fertilization, organic fertilization absence.

In order to eliminate the negative effects of limiting factors of agricultural production and thereby improve the productive potential of land belonging Piteşti Plain are necessary (Figure 9):

- in the south and center on the terrace VII in right localities Costeşti, Lunca Corbului, Albota on luvisols and vertisols are necessary radical fertilization and scarification;
- the right localities Cerbu, Pădureți and Piteşti on typical luvosols and albic luvosols are necessary scarification, liming material and fertilization radical;
- on aluviosols are necessary damming in works and current fertilization with fertilizer organominerale, on the terrace I of Argeş and Teleormanului;
- near the Smeura locality and east of the Cerbu locality, left Teleormanului on stagnosols and luvosols albic is necessary scarification, liming material and organic fertilization;
- on gleiosols in east part of the territory studied is necessary lowering the groundwater below 2 m and work drainage;
- to the north Stolnici and to the south Lunca Corbului on a small surface is necessary to work erosion control soils.

The territory we occupied the predominant Piteşti Plain pastures (Figure 10). Cultivated land they'll meet near localities Stolnici, Pădureți, Lunca Corbului, Costeşti, Albota, Bradu and Piteşti, being represented by cereal crops (wheat, maize) (Figure 11, 12), technical plant (rape) (Figure 13), etc.

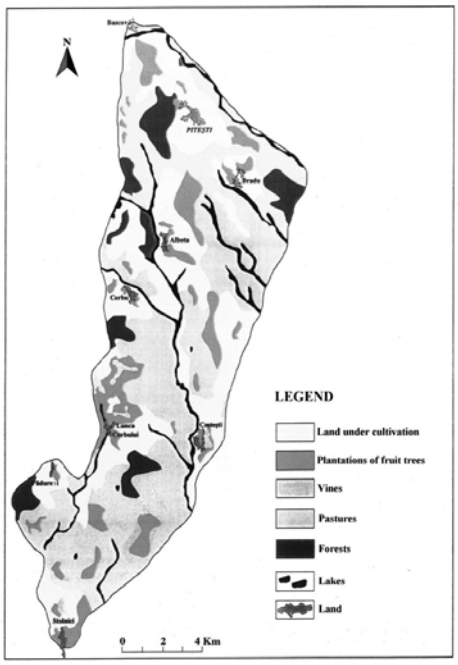

Figure 10. Piteşti Plain. Land use map

Figure 11. Culture of maize on the terrace Argeş

Figure 12. Culture of wheat on the terrace Argeş

Figure 13. Culture of rape to the north Costeşti

In this area may meet many plantations of fruit trees (especially plum) at Stolnici, Lunca Corbului, Albota, Bradu, near Bascov.
Also within the territory studied appear small areas of land planted with vines more south near Lunca Corbului.
Local forests occur in the west and north of the territory. They consist of *Ouercus robur*, *Q.frainetto*, *Fagus sylvatica* mixed with *Quercus frainetto*.

CONCLUSIONS

The studied the Piteşti Plain is located in the south, south-east of Romania, in its plain of the same name. Piteşti Plain geological composition is closely related to that of the Romanian Plain east of the stages of its evolution.
From a geomorphological differ interterritorial, terraces, floodplains, and the microrelief elements can river bed, glacis, dejection cones, slopes, relief residuel, rill erosion and sheet erosion.
From a climate perspective studied area is located within the continental temperate climate zone belonging subhumid moderate heat (subareas 1-4), characterized by annual average temperatures 8.5-10.5 ^{0}C and rainfall of 450-700 mm (1) and 700-800 mm (4).
Under the continuing influence of pedogenetic factors and associated mentioned in Piteşti Plain formed and evolved a wide range of soils, belonging to several classes, namely: protisols, cambisols, luvisols, vertisols and hidrisols.

Based on detailed knowledge of the potential of the natural environment factors, considered separately and in their complementarismul integrated in Piteşti Plain were distinguished four categories of land: the land without restrictions or impaired (class I) to those with severe limitations (class IV).

Eliminate the negative effects of factors involves the application of several measures and works pedoameliorative and hydroameliorative. They may be made single and combined with each other.

Very important are the work of loosening or amending soil tillage depth as organic fertilizer and chemical fertilizer supplemented.

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