CONSIDERATIONS CONCERNING SOIL COVER FROM FIZEŞ PLAIN (TRANSYLVANIAN PLAIN)

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Abstract. To sum up, Fizeş Plain is a territorial unit well highlighted in the Transylvanian Plain. This region is delimited from the other units which compound the Transylvanian Plain, especially through its physical and geographical features. For the purpose of this research, soil samples were taken for each main pedogenesis horizon. Also, physico-chemical analysis was performed according to the methodology that currently exists in romanian pedology and agrochemistry laboratories. Some of the analysis methods include Pipette method of interpreting the results after ICPA-Kacinski, Cylinder method (with known volume) and others, as seen in table 1. As a result, regarding the physical-geographical conditions, it has been established that this territory is located according to the soil studies in category III C of complexity. Furthermore, this sector can be considered a curved area of the structure in domes and brahianticlinales, where elevations exceed 400-550 m only on the interfluvial plateaus. Its relief is moderately fragmented, being defined by interfluves that are radially oriented towards South, South-West, as well as towards South-East, as given by the hydrographic network. In conclusion, the soil in the Fizeş Plain area is diversified both in space and tyopology due to the complex factors that have contributed to the solidification process.

Keywords: Fizeş Plain, soil, analysis, relief, slope

INTRODUCTION

Fizeş Plain is a territorial unit well highlighted in the Transylvanian Plain, delimited by a certain specificity, especially through its physical and geographical features. Therefore, starting from this point of view, Fizeş Plain gains a physical-geographical individuality which was defined along with the withdrawal of the Transylvanian Lake's water and the relief carving, following the Northward withdrawal of the rivers, as a result of a base level represented by the Someşul Mare River.

Given the major physical-geographical parameters, the data resulted from the correlative maps (relief, rock, texture, parent material), as well as from the interpretative maps (grouping of land by limiting factors of agricultural production) revealed the fact that this region is delimited from the other units which compound the Transylvanian Plain.

Through its functions, the soil reflects the influence of climate, flora, fauna and human activity on the landscape that formed the parent material in various periods of time, being considered an indicator of the evolution of the environmental characteristics.

As specific features of Fizeş Plain's relief, stand those of the monoclinal relief that have given rise to the cuesta slopes and to the monoclinal obverses.

From a geomorphological point of view, in Fizeş Plain have been defined the following elements: slightly inclined slopes, strongly inclined slopes with formation of basal glacis, interfluvial peaks and small watercourses fluvial meadows.

On the other hand, from the lithology of surface deposits' point of view, Fizeş Plain is represented by Miocene formations as well as by formations that belong to the Sarmatian, the Volhynian and Bessarabian floors and also by those of the Quaternary.

The climate in the Fizeş Plain is on average described by a 8.5°C and by an average quantity of precipitations of 600-700 m/year. Also, its vegetation is mainly formed by oak clumps.

The soils in the Fizeş Plain are classified as coming from the Luvisols class (31%), the Cernisols class (30%) and also from the Protisols one (15%).

MATERIAL AND METHOD

To characterize the soils from the territory represented by Fizeş Plain were taken soil samples for each main pedogenesis horizon. Physico-chemical analysis were performed according to the methodology that currently exists in romanian pedology and agrochemistry laboratories. This methods are prezented in the table below, Table 1. During the field analysis there were examined the characteristics of zonal and intrazonal soils, which in fact have been insufficient studied so far, the geography and their evolution under actual conditions. Also, in the field have been studied and characterized soil profile morphology and, from de genetically horizons thus determined, were taken samples that were analyzed in the laboratory in order to establish their substantial components and to hilight their physico-chemical peculiarities.

Nr. crt.	Analysis name	Methods of analysis
1.	Granulometric analysis	Pipette method of interpreting the results after ICPA-Kacinski
2.	The apparent density	Cylinder method (with known volume)
3.	Coefficient of hygroscopic	Mitcherlinch method
4.	Soil reaction (pH- H_2O)	Potentiometric method in suspension with liquid solution 1: 2,5
5.	Carbohydrate content ($CaCO_3$)- (%)	Scheibler gas-volumetric method
6.	Humus (%)	Walkley-Blak method, amended by Gogoaşă
7.	The nitrogen content (N-total %)	Kiejdahl method
8.	Mobile phosphorus content (P- mobile ppm)	Colorimetric method, in solution of acetate amonium lactate at a 3,75 value of pH
9.	Mobile potassium content (K – mobile ppm)	Flamphotometric method, in solution of acetate amonium lactate at a 3,75 value of pH
10.	The amount of basic cations (SB- me/100g soil)	Kappen method
11.	Exchangeable hydrogen (SH- me/100g soil)	Cernescu method by percolation
12.	Mobile aluminum (Al- me/100g soil)	Sokolov method
13.	Active $CaCO_3$ content	Droineau method

RESULTS AND DISCUSSION

1. Physical-geographical conditions

Within this region there are well reflected the physical-geographical fetures that define the Northern sector of the Transylvanian Plain. Given the particularities of a hilly and relatively fragmented relief, with rotten paretal rocks and a varied pedological cover, this territory is located according to the soil studies in category III C of complexity.

Fizeş Plain represents the South-central compartment of Someş Plain, being situated between Cojocna-Sic Hills and Unguraş Hills (in the West and North), Lechinţa Hills (in the Est) and the interfluve Someş-Mureş (in the South).

Localized on Fizeş valley axis, this sector of the Transylvanian Plain can be considered a curved area of the structure in domes and brahianticlinales, where elevations exceed 400-550 m only on the interfluvial plateaus, while a relatively large space is situated below 450 m at the same level as Morii Creek's meadow (or Chiochiş Creek).

The relief is moderately fragmented, being defined by interfluves that are radially oriented towards South, South-West, as well as towards South-East. This orientation is given by the hydrographic network with slopes that don't exceed 3%, having in this territory altitudes between 190 and 218 m. In order to establish an accurate characterization, an important role have had the morphometric and morphographical elements. Regarding the first element, the medium altitude of Fizeş Plain is 450-500 m, differentiated by sectors, with higher elevations in the central area, where the relief is excediing 500 m. The relief's energy from this area is between 150 and 220 m, slightly increasing towards South, towards the Sic-Cojocna diapir sector and towards North-West, in the area between the settlements Sântioana and Fizeşu Gherlii.

As specific features of Fizeş Plain's relief, stand those of the monoclinal relief that have given rise to the cuesta slopes and to the monoclinal obverses. In general, the monoclinal obverses correspond to the inclinations of the layers that belong to the Badenian (the tuff of Ţaga) with 7-10° directed towards North, North-East and measuring more than 500 m long and sometimes even more because of the Morii Creek's depth and its tributaries. This created the image of a rugged relief, even if the slopes exceed 20-40% only in the Southern and South-Western area. High and medium declivitous slopes were affected by a series of types of landslides, including glimee type and landslides in furrows.

From a geomorphological point of view, in Fizeş Plain have been defined the following elements: *slightly inclined slopes, strongly inclined slopes with formation of basal glacis, interfluvial peaks and small watercourses fluvial meadows.*

- The *slightly inclined slopes*, or the monoclinal ones, present a delimitation of the longitudinal profile, with a lower sector where the slope's inclination is 5-10%, a medium sector with a slope of 10-15% and a superior sector that has the slope's value of 15-25% (the sector that makes the connections with the interfluvial peaks);
- The *strongly inclined slopes, with formation of basal glacis,* appear on the Southern areas, being included in this territory in the basin of Fizeş Valley. Judging by appearance, this types of slopes highlight a linear marbles relief, represented, in this case, by a escarpment which severs the layers' ends and which is oriented oppposite to the inclination of the geological layers;
- The *interfluvial peaks* occupy the upper side of the slopes, standing out in the relief mainly by their general appearance, slightly inclined and with different evolutionary directions. The interfluvial peaks existing in this territory have an asimmetric character, being bordered by strongly inclined slopes in the South and South-West area and also by a vast monocline in the North and North-East region;
- The *fluvial medows* from the Fizeş Valley's basin are part of the overall feature that characterizes the water courses from the central of the Transylvanian Plain. The width of the main water courses' river bed is over 300-400 m, while in the secondary courses, represented by Fizeş River's tributaries falls down to values below 100 m.

On the other hand, from the lithology of surface deposits' point of view, Fizeş Plain is represented by Miocene formations as well as by formations that belong to the Sarmatian, the Volhynian and Bessarabian floors and also by those of the Quaternary. The Miocene formations are composed by marl clay with insets of sand and volcanic tuffs (Volhynian and Bessarabian), while the Sarmatian ones are characterized by marl, marl clay and sandstones with conglomerates insets. In some sectors, these last sedimentary formations, as a result of the erosion processes' action, have come to the surface with another deposit composed of marl clay with insets of volcanic tuffs in thin layers as it is for example the Ţaga Tuff.

If we stop upon the climate, Fizeş Plain is characterized by an average temperature of 8.5°C and by a average quantity of precipitations of 600-700 m/year.

As for the vegetation, it is represented by oaks clumps. As the cartographic documents from the late eighteenth century reveal, the reduction of forest fields and natural grassland was made in an alert rhythm and in favour of agriculture that was given gain more and more attention.

2. Plain Fizeş soil

As the below diagram reflects, the soil cover of Fizeş Plain is dominated by the soils from the Luvisols class (31%), the Cernisols class (30%) and also from the Protisols one (15%).

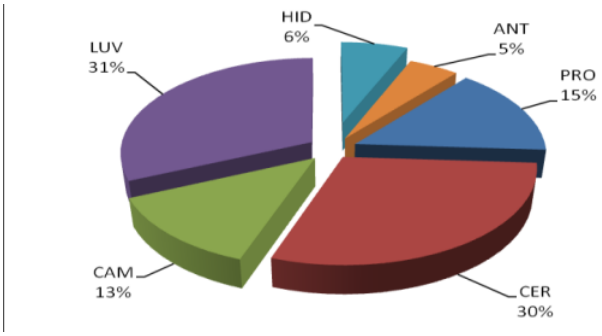

Fig. 1. *Soil classes share from the Fizeş Plain's soil cover*

Further on there will be presented the main classes, types and subtypes of soil, according to the *Romanian Taxonomy System of Soil (2003)*, by grouping initially the soils that respond to the latitudinal-altitudinal zonality and then those with an azonal character: conditioned by the nature of he parental material (*limestone regosols*) and the humidity excess (*gleyic aluvisols*) and ending with the weathered and/or anthropogenic altered soils (*weathered antrisols*), respectively the soils that are pedogeticly poorly differentiated (*Protisols*). For this study, the soil cover was analyzed through *class*, *soil type* and *subtype*.

- The soil classes differ depending on the specific soil profile, grouping the entities characterized by a certain stage of development, the presence of a particular pedogenetic horizon or some essential properties, considered as specific diagnosis elements of the twelve classes;
- The soil type stand out in a soil class through a specific manifestation of one or more of the following diagnosis elements: the class' specific diagnosis horizon and/or its association with other horizons, the moving from or to a class' specific diagnosis horizon, the aquatics and salino-sodium properties etc. These features

are actually the result of the complex action of the pedogenetic processes and factors;

- The soil subtype is a taxonomic sub-unit within the genetic type that groups the characteristic entities through a certain degree of expression of the diagnosis elements specific to the type and through a certain sequence of horizons (some making the transition to other types of soil), including certain features of a great practicl importance.

2.1. The Protisols Class (PRO)

The Protisols class is composed of the following types of soil: *limestone regosol*, *limestone regosol with active landslides and deep erosion*, *mollic regosol*, *limestone aluvisol* and *colluvic aluvisol*. Being young soils, undeveloped or poorly evolved, they are characterized by a low fertility, a good permeability and a clayey texture which favors the occurrence of erosion processe.

The soils from this class present an A horizon (Am and Ao), being generally developed on unconsolidated or poorly consolidated parental material with a high content of calcium carbonates. The presence of regosols is conditioned by the geological erosion (slow and long) on tge level of moderate-strongly inclined slopes, modeled mostly on unconsolidated rocks, feature that makes this type of soils different from the lithosols. Under these conditions the solidification is mantain in a less advanced stage, one of a relative balance between the morphogenesis and the pedogenesis.

The *colluvic aluvisol* was formed as a result of the accumulation process of the materials from the slope and placed at their ground-base, in contact with the adjacent meadows. The *limestone aluvisols* are situated on the Fizeş floodplains and Fizeş River's tributaries, having a layered textured by the presence of the sand and gravel layes with those of a clay loam nature, plus a high content of secundary nature calcium carbonate.

The e*ntiantrosols* are typological entities in course of the forming process, developed on anthropogenic parental material having a thickness of at least 50 cm or of only minimum 30 cm if the anthropogenic parental material is skeletal (on this thickness). It does not presents other diagnosis horizons beside de Ao horizon (exceot those that can cover the Am horizon). The main subtypes from Fizeş Plain are: *urbic* and *garbic*, located near town, where there appeared legally unequipped rampes for the domestic and industrial waste disposal.

2.2. The Luvisols Class (LUV)

This is the soil class that holds the largest share of the Fizeş Plain's pedological cover, as well as of the Northern half of the Transylvanian Plain. Within this class the preluvosols are the best represented, with a share of 88% (*typical preluvosol*, *moderated stagnogleyed preluvosol*, *molic moderated stagnolgleyed preluvosol*), followed by luvosols in a 12% share (*typical luvosol*, *typical luvosol with active lanslides* and *stagnogleyed luvosol*).

The soils in this class have been developed on the clayey, clay loam or loam alteration products of some rocks with poorly bases content, respectively sandstone or on placers or silty or clayey reworkeds that form deeps covers. All these soils are characterized by a high textural differentiation (the presence of an argic diagnosis horizon), high exchange capacity of the clay, a more that 53% of the base saturation for the preluvosols and less and 53% for luvosols.

When they are not cultivated for agricultural purposes, Luvisols are acidic soils with a pH value between 5 and 5.5 and a high C/N ratio. Often, especially on the Northern slopes of the exhibition, there are low-moderate stagnogleyzation processe that the soil's chromatic aspect becomes marbled. Generally, the studied Luvisols have a bright color, clearly defined horizons, moderated accumulation of unsaturated humus, plus other characteristics which confer fertility modeled dor the main uses and agriculture crops.

2.3. The Cernisols Class (CER)

After the Luvisols class, the Cernisols class is the second soil class surface that can be met in the Fizeş Plain, on the level of the slightly inclined slopes with different exhibitions. This class includes the following types and subtypes of soils: *typical faeoziom*, *gleyed faeoziom*, *clinogleyed faeoziom, argic faeoziom*, *argic faeoziom with stabilized landslides and depths erosions*, *slightly stagnogleyed argic faeoziom*, *moderate stagnogleyed argic faeoziom*). Generally there are soils characterized by a clear accumulation of organic material, having a mollic horizon (Am), followed by an intermediate one (A/C, A/Bv, A/Bt). The mollic horizon's color can be observed at least at the top.

The soils that are part of the Cernisols class vary from medium to good from the fertility point of view, having a good permeability and a medium texture. The high percentage of soils in this class can be explained by the existence of the so-called *cernozioming process* of the soil cover from the studied region, process that began way back, in the Holocene perioad and contiues today as well.

2.4. The Hydrosols Class (HID)

The Hydrosols class include the *typical gleysol* and the *limestone gleysol* (gleyed soil, cf. SRCS, 1980), the *typical limnosol* and the *limestone limnosol* (absent in SRCS, 1980). This class of soils is formed in extended conditions of an humidity excess which causes some particular feature of the pedogenetical horizons.

The *gleysols* were formed on a background of an acute humidity excess on the Fizeş River's medow and its tributaries, being of a groundwater nature. During the periods when the humidity excess varies, there are formed the oxidation-reduction gley horizons (Go), while for the cases of extended groundwater excess there are specific the reduction gley horizons (Gr).

The *limnosols* (newly introduced in SRTS - 2003) are characteristic for the lacustrian surfaces from the Fizeş Creek's basin (with a maximum depth of a few meters), assembling the conditions for the forming of anthropogenic lakes (ponds, in this case).

2.5. The Antrisols Class (ANT)

This last class of soils from the current study groups strong and excessive eroded soils (on the surface lies the B or C horizon), but also soils that were heavily transformed by human activity, reason why they have on their surface an anthropedogenetic horizon of at least 50 cm thick, eventually of at least 30-35 cm thick if the parental material was skeletal. They correspond for the undeveloped, cropped or sloppy soils from SRCS 1980 and include *eroded anthrosols*. The last ones remembered are representative for the very strong and excessively eroded or stripped territories such as thos of cuesta, extremely steep, so that the remaining horizons do not allow them to come under one certain type of soil. Ordinarily, they present on their surface an Ap horizon derived from B or C, AC or AR horizons, having less than 20 cm thick. The parental material removed daily through

erosion (or stripping) are considered rock and treated as such. *Erodosols* are quite commonly spread, given the large extension of land sloping (over 2/3 of the country's territory).

CONCLUSIONS

The soils cover from Fizeş Plain is diversified both in space and typological due to the complexity of the factors that have contributed at the accomplishment of the solidification process.

There can be seen a zonal distribution of soils, characteristic, in terms of climate and vegetation, from the Luvisols, in the hilly peaks and the poorly-moderate inclined slopes, till the Cernisols, when reaching the lower altitudine areas.

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