EDAPHIC RESOURCES IN GERU BASIN, GALATI COUNTY

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Abstract

*Knowledge of the soils of a region is important from both geographically and agronomic, leading to better use of resources and scientific nature. Geru river has an area of 410 km² in which prevails C**hernozems and Fluvisols**, and on smaller surfaces, eroded phase of Cambisols and Calcaric Regosols and Gleysoils. Their main nutrient supply is generally weak (except for potassium), requiring increased attention and application efficiency.*

Key words: edaphic resources, Geru, GIS, supply level.

INTRODUCTION

Geru river is a tributary of order three of Siret basin, having confluence with Bârlădel River on the South of the village Piscu, Galaţi County, at an altitude of 9 meters, with an area of 410,65 km², presenting a major ongoing North-South between 45º43'12" and 45º57'26" latitude and 27º 37' 50" and 27º 47' 32" longitude East, having a fusiform appearance.

As physical-geographical units, Geru develops in the upper part over Covurlui Hills, in the middle sector beeing the natural limit of Covurlui Plain (left side) and Tecuci Plain (right side), with the southern sector (extensively modified anthropic) having subsidence characteristics specific to Siret River Inferior Plain. Thus, parental materials of soils are represented by loess and loessoid deposits, alluvial deposits on valleys and colluvial deposits at the base of the slopes. In these conditions the predominant soils are Chernozems, plus Fluvisols, eroded phase of Cambisols and Calcaric Regosols, and on a very small surface Gleysols. They present medium granulometries in the largest part of the territory (91,41%), poor supplies with nitrogen and phosphorus, but good and very good with potassium, under conditions of weak acid and weak alkaline reactions.

MATERIAL AND METHOD

Preparation of this study included documentation of the actions library consisting of a series of works having as main topic the ground, agricultural services and invoice papers environmental knowledge.

In TNTmips program, version 6.4, produced by Microimages, Inc., Lincoln, NE, USA, which is a GIS, were drawn up various thematic layers with parameters measured or derived of soils. For drawing up the map of the

soils has proceeded to the transformation of soil units from the RSSC in RSST for certain common, after soil maps from the archives COSAS Galați, were scanned, georeferentiated and then processed.

Over Digital Elevation Model (DEM) were retrieved from the layers of soil types and subtypes, which were assigned colors, hatch and symbols according to "The colors and conventional signs atlas for soil map legend, proposal for G.I.S. users"-Terra Nostra Publishing House, Iaşi, 2007. Primary Cartographic base was made up of topographic maps 1: 25000, soils maps 1:10000, Digital Elevation Model.

RESULTS AND DISSCUSIONS

Classes of soils identified in Geru basin are (fig. 1): Fluvisols (5868.94 ha-14.29%), Chernozems (32483.26 ha-79.10%), Hydrogenic soils (190.50 ha-0.46%) and Eroded phase of Cambisols and Calcaric Regosols (2523.18 ha-6.14%).

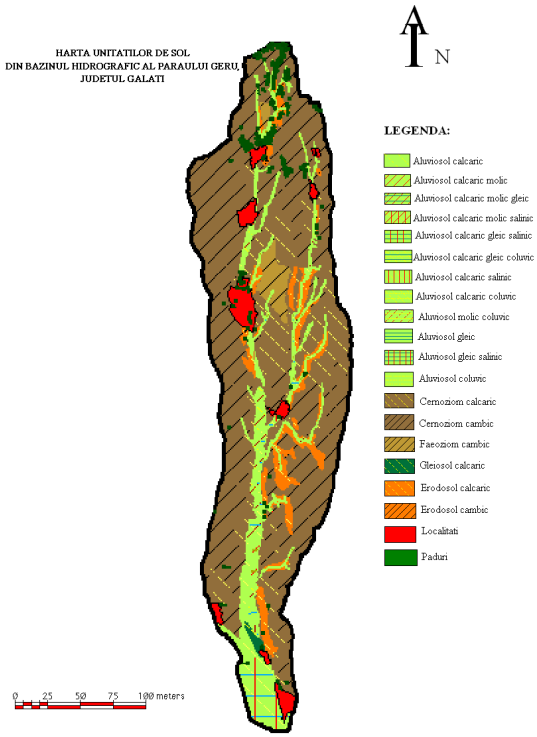

Fig. 1 A map of soils in Geru basin, Galați County.

Fluvisols are the prevailing meadows, developing a variety of sub-types: Calcaric, Mollic, Gleyic, Salic, simple or with various combinations between them. In the upper basin, meadow being narrower, the erosion of the valley more intense, so Fluvisols are represented by subtypes Calcaric

and/or molic. Tributaries of Geru river have temporary water courses, this resulting in storage in aluvial ahead of materials for slope, driven in geomorphological characteristics current processes, or of poor farming techniques. These materials are getting parental materials developing specific subtypes (10,61 km^2) with different textures or extending the horizon of soils on the valleys.

In the middle basin, but especially in the lower meadow, the aquifers ascend in many places, the aerobic processes alternating with the anaerobic ones, causing the precipitation of oxides and hydroxides of iron and manganese, by printing specific color of gleyic processes over 25.7 km^2, having intensity from moderate to strong. Salination of Fluvisols is present in the lower half of the basin (19,02 km^2), ranging from weak to moderate, being determined by the migration of salts by the upper part of the soil profile and groundwater chimical composition.

Chernozems class is represented by Calcaro-calcic Chernozems (79.95 km²), Haplic Chernozems (233.89 km²) and Haplic Phaeozems (11 km²).

Calcaro-calcic Chernozems predominate in the central part of the basin, in the territory of Cudalbi, located between Geru and Gologanu rivers and then all located between Gologanu and limit of the basin, after which follow the hillsides of Geru basin until it expands its meadow at South-West from Piscu. Prevails in Covurlui Plain, at altitudes not exceeding 150 m, permeating on Covurlui Hills once the inflection of this value. Due to the positioning of these soils on gradients exceeding 3°, the upper horizons are eroded from weak to strong, dropping their productive potential, presenting typical morphology Am-AC-C, with carbonate throughout the soil profile, reaching base profile at high concentrations, over 12% as acumulative form.

Haplic Chernozems are prevalent on the plateaus and slopes from weakly to strongly inclined. They have morphological types Ap-Am-AB-Bv-BC-Cca, Ap-AB-Bv-BC-Ck or Ap-Am-AB-Bv-C. The profiles are long, with small structure in surface horizons and polyhedral or prismatice in Bv horizons, exceeding 150 cm deep, with a large and very large edaphic, with depths of carbonates between 45 (by ascension) and 115 cm. It was developed on the parental materials consisting of eolian deposits (loess and loessoid deposits) with middle granulometries, for the most part, except for some soil units from the territory of Mărului Valley (Northwest basin) where are coarser deposits (thanks to Bălăbăneşti gravels), and certain areas in the lower third of the basin (Tudor Vladimirescu, Lieşti and Pechea villages) with soils developed on parental fine materials, which require close attention in terms of permeability.

Haplic Phaeozems are characteristic of more humid regions and they appear in the basin only between Geru and Gologanu in Cudalbi territory of

land having weak and moderate slopes and Southern and Southeastern expositions. Slightly further North, in the village Smulţi Haplic Phaeozem overlap Mândra Hill, up to the confluence with Mândreşti Valley, North of the forest with the same name. They have deep profiles, well delineated, characterized by the morphology like Ap-Am-AB-Bv-Cn. These soils do not show Cca horizon about the first 125cm in the case of medium-textured soils. In the intermediate horizon are present organo-mineral films. The pedogenesis processes is characterized by intense bioaccumulation and formation of mull humus, migration colloids, humus and clay, from the A horizon and their submission to the B horizon in the form of organo-mineral film on the faces of structural elements and in rafts. For this reason, at the level of the A horizon, appear differences between the dry and wet condition (over 1.5 crome or values).

Hydrogenic soils class encompasses soils, where the water has a very important role in the formation, evolution and their properties. In Geru area, on Piscu territory (near the confluence with Bârlădel River) was identified a Calcaric Gleyisol over 6.2 km^2, wich has a morphology like: Ap-$CkGO_1$-$CkGO_2$-CkGR. Parent material consists in alluvial deposits with fine particles having a faulty aerohydric regime, which does not allow exploitation of the potential high fertility of these soils.

In Anthrosols Class enter all soils wich have upper horizons removed due to excessive erosion, caused by anthropogenic activities. In Geru area are present Calcaric Regosols (over 20,49 km^2) and Eroded phase of Cambisols (over 4.74 km^2). Calcaric Regosols occur on slopes of more than 15°, the foreheads of hillsides with Northern and Western expositios of Gologanu River and its tributaries in Covurlui Plain. A small portion with this subtype develops on the South of the village Cudalbi on the right slope of Geru river, in Tecuci Plain. They present a morphology of type AC-C, with very large amounts of carbonate, which, by erosion have been brought to the surface and need improvement measures. Eroded phase of Cambisols appear on the slopes, but in the Northern part of the basin, on the slope of Mândra Valley, with West exposition, then, to the East of the residence area of Mândreşti village, on the steep slopes of Pârleşti Hill and on the foreheads of hillsides with West exposition of Mândreşti Valley. They present the Bv surface horizon, followed by an intermediate BC horizon, which make the transition to the Cca horizon. The fertility of these soils is closely linked to that of the soil in which they arise, but it is classed in down limits, which involves taking some measurement of prevention and control of erosion process, through the application of measurement antierozional management, chimical and organical fertilization, etc.

Agrochemical characteristics of soil are very important in the context of the growth and development of plants. Knowing the nutritional relevance

measures and increases vegetable yields agrochemical. Elements involved in plant nutrition have specific roles and cannot replace each other, therefore were drawn up thematic maps in which are presented the supply levels with nitrogen, phosphorus and potassium of soils in Geru basin, Galați County. In Geru area soils present supplies of nitrogen from very poor to medium (Fig. 2). The one that prevails is the supply of very poor, occupying an area of 21114.10 ha (51.41%), over Haplic Chernozems and Anthrosols. Poor supplies occupy an area of 4543.85 ha (11.06%) in all types of soil, except Phaeozems. Medium values are spread over 15407.93 ha (37.53%) and are found in all types of soil, less in Gleyisol and Anthrosols.

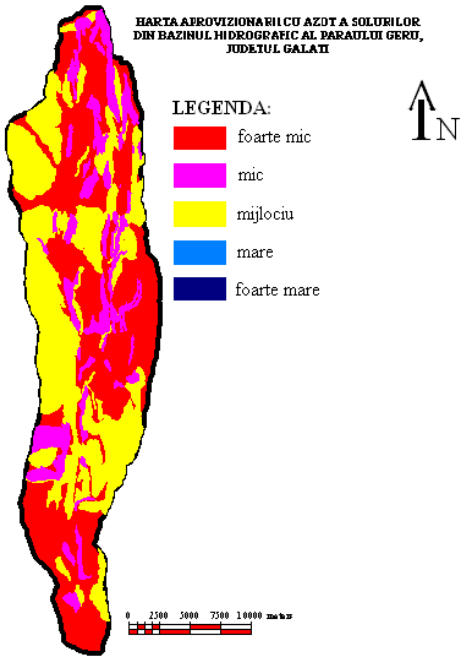

Fig.2 A map of soil nitrogen supply in Geru basin, Galați County

"Phosphorus is found in all plant organs, but especially in the seeds and growing tissues, in the constitution of the necessary substances vital processes, participating in making genetic code, participates in enzymatic processes of synthesis, increases the resistance of plants to drought, etc." (R. Lăcătuşu, 2006). In the researched territory, are all the intervals on the level of soil phosphorus supply (Fig. 3). Very poor supply dominates with 19934.40 ha (48.54%), being found in all types of soil, except Phaeozems, but prevailing in Haplic Chernozems and Anthrosols. This deficiency can lead to a disorder of the metabolic processes of plant growth and development. Poor sourcing is on a surface of 10399.40 ha (25.32%) and is present in Phaeozem on Corod territory, in Fluvisols, Chernozems and

Anthrosols. The medium supply has a weaker representation (6371.80 ha-15.51%) being found in Fluvisols, in Calcaric Chernozems only in the territory Cudalbi and Liesti, in Anthrosol from Marului Valley area and on a broader surface in Haplic Chernozems. Good supplies shrink as areal (3634.99 ha-8.85%) at a few Fluvisols, Calcaric Chernozems on Cudalbi, Grivița, Piscu territories and Haplic Chernozems only at Corni, Smulți and Cudalbi territories. Very good stocked (725.29 ha-1.78%) are Calcaric Chernozems of Grivița and Cudalbi territories, Haplic Chernozems and Fluvisol of Mărului Valley.

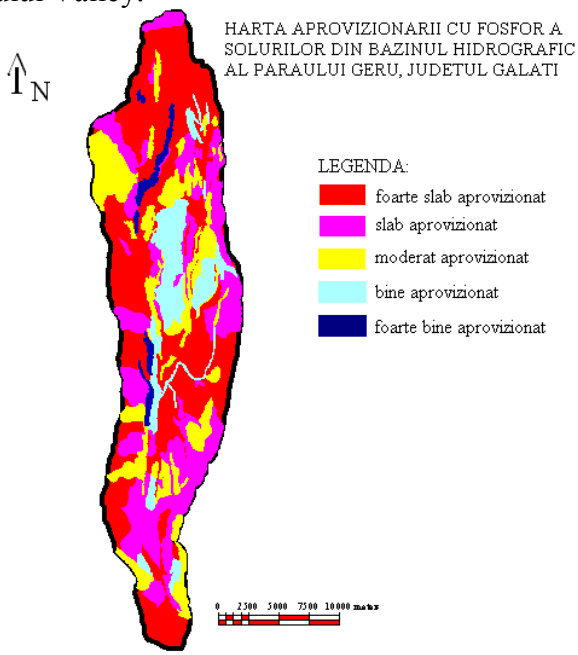

Fig.3 A map of soil phosphorus supply in Geru basin, Galați County

"Potassium cation is most important for living organisms, fulfilling numerous physiological and biochemical functions" (R. Lăcătuşu, 2006). Analyzing the map below (Fig. 4), it is noted that in the area's soils predominate good values (24201.61 ha-58.93%) and very good (10951.98 ha-26.68%), the latter having great development in the area of Grivița and Cudalbi in Calcaric Chernozems, and in the territories of Grivița, Pechea, Tudor Vladimirescu, Corni and Smulți in Haplic Chernozems. Medium sized values (4141.26 ha-10.08%) are characteristic of Gleyic Salic Fluvisol from Piscu, of Calcaric Chernozem from Marului Valley, predominantly in Haplic Chernozems, Phaeozems and Anthrosols. Poorly supplied are in Calcaric Mollic Fluvisol and Calcaric Salic Fluvisol, Calcaric and Haplic

Chernozems from Lieşti territory, as well as a small area of Haplic Chernozems in the territory of Tudor Vladimirescu and Pechea.

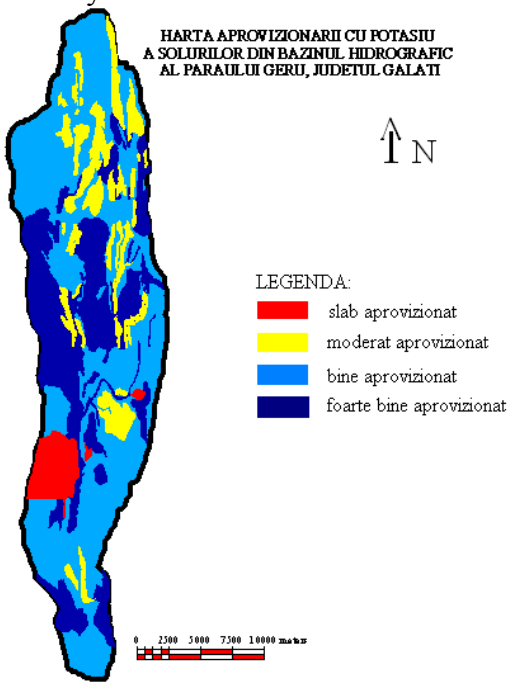

Fig.4 A map of soil potassium supply in Geru basin, Galati County .

CONCLUSIONS

Being located in Central-Southern part of Galati County, with an area of 410 km², belonging to four morphological units (Covurlui Hills, Covurlui Plain, Tecuci Plain and Siret Inferior Plain) with parental materials of porous type loess and loessoid deposits, with a temperate-continental climat, Geru basin presents the following Classes of soils: Fluvisols (5868.94 ha-14.29%), Chernozems (32483.26 ha-79.10%), Hydrogenic soils (190.50 ha-0.46%) and Eroded phase of Cambisols and Calcaric Regosols (2523.18 ha-6.14%).

As regards supply levels of soil nutrients, they have low levels and is necessary to apply fertilizers, in compliance with Code of Good Agricultural Practices, but also the making of management works to prevent washing these items. In Geru area soils present supplies of nitrogen from very poor to medium: Very small (21114.10 ha-51.41%), Small (4543.85 ha-11.06%), Medium (15407.93 ha-37.53%).

In terms of phosphorus, are present all levels of the supply: Very small (19934.40 ha-48.54%), Small (10399.40 ha-25.32%), Medium

(6371.80 ha-15.51%), Good (3634.99 ha-8.85%) and Very good (725.29 ha-1.78%).

In Geru basin predominate good values (24201.61 ha-58.93%) and very good (10951.98 ha-26.68%) of potassium.

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