RESEARCH ON SOME DEGRADED SOILS IN ARAD AND MITIGATION MEASURES TO IMPOSE

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Abstract*. The main environmental and socio-economic functions that have soil , impart quality support for the development of life, but also functions as a „recycler" of dead organic matter and some pollutants. Arad is located in the west of Romania and covers an area of 7.754 km2 (3.2%) is the sixth largest city in Romania. It has a varied relief, being represented by mountains, which occupy about half of the county (Forest-Moma Mountains, Zarandului; Găina) hills with heights of 200-400 m (Crişene Hills, pediment Syria Hills Lipovei) plains that make up the lowest step of 95-200 m and comprises Cermeiului Plain Plain White Cris, Arad high Plain and Plain Vingăi. The agricultural area of Arad County is 66% of the total area of the county and 3.4% of Romania, of which 68.46% is arable and use, while 24.75% is occupied by pastures, land ownership structure majority being private. Due to massive deforestation, soil transformations use categories, especially in arable or pedogenesis processes that have changed meaning, whether amplified the speed and intensity of expression. Most times, the evolution of these soils within a chaotic, with overruns stage without the normal interactions between the various factors enter into the process. The county has the following river basins: Cris Black, White Körös, Maros and Bega. The hydrographic network is dominated by the two arteries: Mures, with a total length of 761 m (220 m in the county) and Cris White. This paper aims to make a survey of the main soils in Arad affected by some degradation processes, stakeholders and improvement measures are taken to prevent future undesirable manifestation of these processes. Soils taken in the research were: Luvisols, Stagnosols, Gleysols, Anthrosols and Anthrosols erodic. The main degradation processes of these soils are represented by erosion, organic matter decline, contamination, compaction, soil sealing, landslides and floods.*

Keywords**:** *soil, degradation, improvement, process, factor.*

INTRODUCTION

Is the natural soil layer located on the surface of the earth crust, and having properties specific functions is a product resulting from the action of time-consuming and biotic and climatic factors related to the rock surface to which is added increasingly more anthropic action.

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As river basins within the county Arad, we have: Cris Black, White Criş, Mures and Bega. The hydrographic network is dominated by the two arteries: Mureş, with a total length of 761 m, including 220 m on the White Cris Arad county.

MATERIAL AND METHOD

Among the physical properties of the soil is then determined:
- Soil texture - Cernikova method;
- Density of the soil - using pycnometer;
- Apparent density of the soil - by means of cylinders;
- Porosity of the soil - was established by calculation.

From the chemical properties of the soil is then determined:

- Humus content - Tiurin method;
- Soil reaction - by potentiometric method in aqueous extract 1:2.5;
- Total nitrogen content in% - was made by the Kjeldahl method (soil mineralization is made by boiling with concentrated sulfuric acid in the presence of catalyst);
- Total phosphorus content and mobile was determined by Egner-Rhiem-Domingo on a spectrophotometer UV - VIS;
- Assimilable potassium content - extracted into ammonium lactate was determined by atomic absorption spectrophotometer.

RESULTS AND DISCUSSION

The research was conducted in the county of Arad and the main soils that have undergone various stages of decay, are Luvisols, Stagnosols, Gleiosolurile, Antrosol and Antrosol eroded.

Table 1 shows the size and weight of the various categories of agricultural land in Arad.

Table 1.

Distribution of agricultural land in Arad, by use

Nr. crt.	Category farmland	Surface (ha)
1	arable land	349 992
2	Meadows and natural pastures	25 502
3	pastures	126 533
4	orchards	5 594
5	Live	3 603
6	total agricultural	511224

Source: *apmar.anpm.ro/upload/4031_apmar_PLAM.doc*

Soils in the study and are in different stages of degradation are Luvisols, Stagnosols, Gleiosols, Antrosol and Antrosol eroded.

1. Luvisols. These are soils that have formed and evolved on old material, the blanket, under a corrugated relief and are spread mainly in the forest. Textural differentiation is related to both the parent material stratification and their evolution polyphasic and polistadială, pedogenetical translocation times of old. They have a genesis similar to that of preluvisols but have a most advanced stage of development, with increased and decreased iluvial process of bioaccumulative. În condiţiile unui drenaj extern favorabil şi a unor materiale parentale mijlociu-fin textural, luvosolurile evoluate s-au prezentat într-un stadiu redus de stagnogleizer.

Luvisols depth and degree of development of these horizons is conditioned largely by the topography of land that have been submitted blanket materials, materials that supported the pedogenesis processes. The slopes and narrow ridges of soil depth is reduced, while the terraces and large floodplains Profiles shows horizons well defined and developed. Most of the Luvisols are however steep slopes. In some areas, erosion brought about parenting raw rock surface, where part of the land is already set aside or found in states of poor quality. The largest area occupied by Luvisols are affected in varying degrees of intensity, erosion surface or the depth, or in danger of being affected in the future more or less distant. The size of the impact of erosion on soil cover vegetation depend upon the strength and structure of the dislocation and transport. In both cases, however, the necessary measures to identify the fields in which erosion factors act with speed and various intensities, depending on the type and subtype of soil and land use. Land that has supported every year one or more agroculturale interventions, most often at high risk of degradation, now find themselves in a delicate balance, often already

broken, with negative repercussions on the status of soil quality and their capacity of production.

The properties of these soils are very restrictive. Bulk density varies very broad upper horizons A and E (1.20-1.40 g/cm^3), total and aeration porosity were in the upper horizon sized values after changing its essential characteristics Bt horizon: total porosity decreases not usually a fall below the lower values (differentiated according to the size composition) and aeration porosity, particularly Bt horizons decreases widened to near zero. Total water capacity is high bioaccumulative horizon (over 450 mm/100 cm) and medium to small alluvial horizons. Useful water capacity is very high horizon (over 200 mm/100 cm), and then decreases gradually to medium and small values in the alluvial horizons (below 140 mm apă/100 cm). Field capacity is relatively uniform throughout the middle profile, ranging from 275-400 mm water/100 cm. Horizon fading coefficient for maximum exploration of the roots is low (below 100 mm apă/100 cm). Luvisols are also low in humus (3-4% under pasture 1-3% of arable land), total nitrogen (0.08 to 0.02%), phosphorus (15-20 ppm) and especially in potassium (less than 40 ppm). C:N ratio is 13-16. The total cation exchange capacity, very small A and E horizons (under 10 me/100 g soil) may increase up to double the horizon iluvial becoming middle (20-35 me/100 g soil).

The debazification upper horizons of these soils is relatively advanced, ranging from trace mesobasic limit in relation to the nature of the parent rock or various human intervention. When the parent material developments Albic Luvisols initial acid base saturation remains low in appreciable thickness (holoacid character), a situation encountered isolated hilly area investigated. In the most common situations present horizon iluvial percent base saturation of 70-85%, especially in areas where materials have evolved luvisols smectite. Oscillations specific degree of base saturation are observed with the reaction, which is highly acidic (pH <5.2) at the surface remains or becomes moderately acidic (pH <5.8) in the soil profile evolved acidic parent materials or pH increases slowly at depth in soils evolved clayey and clayey parent materials.

Regarding fertility Luvisols, although typically a large volume edaphic potential fertility of these soils is low (38 points - grade VII) due to their regime and nutrient aerohidric unfavorable. The most fertile are luvisols batistagnice, neerodate classified as grade fertility, and luvisols mezostagnice, the eroded etc.

When taken in culture and fertilized soils there is an enrichment of basic cations, but the use of these nutrients by plants is restricted to volume plowed layer (0-20 cm) due to strong acid reaction and high mobility of aluminum from eluvial horizon, followers. Soils under grassland had a higher content of humus, nitrogen and phosphorus, but organic nitrogen mineralization capacity is low. Agricultural use as arable soils of these restrictions is increased due to unsatisfactory temporary lift (wet periods) or their compactness forward (dry periods).

For improvement needed some agro and agro-chemical interventions, such as moldboard plowing in temporary Exes moisture mitigation; limestone to correct amendments to the reaction conditions; organic fertilizers to increase the reserves of humus and fertilizers, especially potassium. Due to the high content of clay minerals type aluminous vermiculite or chlorite dioctaedric in these soils, potassium administered is hardly mobilized. To avoid increasing the ratio K / Mg is recommended actions to amend calcium, especially dolomite.

2. Stagnosols. Training and development stagnosols generally associated with depression relief patterns of materials with fine textured soil formation, with increased rainfall and sometimes with sliding processes, especially in areas with landslides, which is why some of these soils formed in material smectite and others deluvo - colluvial deposits fine medium and fine. In addition to this low permeability in the range 40-60 cm horizon due to the presence of clay and compact. Above the clay horizon in the area of alternative soil moisture is achieved

with sescvioxizi concretion sequence, ferro -manganese bobovine or deposits. This provides a distribution of free iron that migrate in the first part of the horizon bioaccumulative and concentrated at the bottom and possibly eluvial horizon.

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Physical and physico -mechanical properties of these soils are emphasized restrictive: the apparent density with high values, the total porosity is very low values, the degree of compaction is increased, aeration porosity is emphasized restrictive, plus hydro properties, which also are deficient.

Fertility stagnosols not suitable for agricultural use. Geomorphology trough, low permeability, excess moisture extended only three of the many limiting factors of these soils that fall into favourable class IX for arable and horticulture and sixth grade pasture.

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3. Gleysols. Soils are heavily affected by underground water, reduction processes making it visible from the surface by marbled colors in neutral shades predominating.

In the superior horizon gleysols are accumulated large or small quantities of organic matter in different stages of humification. Depending on the percentage of humus, the nature of the materials and processes of soil formation maturity, gleysols differentiate the subtypes. In terms of location, all gley soils are found in the lowlands of the meadows at the base of the slopes, where meteoric water plus the volume of undergroundwater is increasing excess moisture stressed.

Less suitable for agricultural use (27-30 points eighth grade), vertic gleysols are recommended for use as pasture and meadow, land use categories falling within the higher suitability classes (50-70, grades IV - VI).

Lands with a better overall drainage in areas with low intakes recent materials were formed and evolved cambic gleysols (2865 ha - 2.32%). In these circumstances, there are incipient alteration processes, leaching, debazificare with structural differences and color and contour of a cambic horizon. The restricted gleysols are permanently affected pedophreatical intense level surface (0-50 cm). I epigleice subtype and appear azonal in deep dales or contact meadow with first terrace on an area of 2652 ha - 2.15%. Suffering from permanent excess groundwater to the surface of these soils has installed a rich hydrophilic vegetation with *Carex, Juncus, Phragmites*.

In these circumstances it is improper use as arable (18 points - ninth grade). A higher favorability have for pasture and hay land use (52 or 46 points). Pastures and hayfields are infested hydrophilic species but low economic value. In many cases the land surface is covered with dense grass mounds caused by overgrazing in the wet before and the expansion of hydrophilic species with deep rooting .

Unimproved condition, gleysols are less productive. Use only as land for fodder, but hay crops are poor or are short range.

Gleysols having low fertility due to microbiological activity diminished. Under natural conditions in class VIII suitability for arable (29 points). After draining the total production capacity of these soils can be raised to grade. Generally used for grazing and hay, which uses gleyic soils are found in higher quality classes.

To their relief work is needed to regulate watercourses and drainage ball for lowering and maintaining control of the groundwater. It is associated works to improve system pedo aerohidric and organic fertilizer and chemical works periodically.

4. Anthrosols. Bodies are required emphasized modified under anthropogenic influence. Formerly the old soil horizons can not be identified or remaining fragments of these horizons can not facilitate employment soil type or subtype present initially.

Due to massive deforestation, transformations use categories, especially for the benefit of arable or pedogenesis processes that have changed meaning, whether amplified the speed and intensity of expression. In these cases went chaotic evolution with overshoot of steps without the normal interactions between the various factors enter into the process.

The profound changes of these soils that distinguish them clearly from soils that have evolved radical remedial action required. Where anthrosols suffered sharp negative changes, to restore them to their original state is not enough to eliminate the restrictive factor, but require further improvement forces, opposite.

As forest was replaced Silvestre Luvisols have changed trend direction. Upper horizons were developed bioaccumulation widened lower horizons have perpetuated the characteristics and processes of soil formation have undergone obvious changes.

CONCLUSIONS

The agricultural area of Arad County is 66% of the total area of the county and 3.4% of Romania, of which 68.46% is arable and use, while 24.75% is occupied by pastures, land ownership structure majority being private.

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