

## CONSERVATION OF SOIL RESOURCES IN ARCHIS LOCALITY, ARAD COUNTY

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**Abstract.** *The purpose of the work is represented by the identification and characterization of soil and land units in the locality of Archiș, Arad county. This was achieved through the bibliographic study of the soils in the researched area, by making observations in the field, and collecting and analyzing soil samples from the field. Following the identification and characterization of the soils in the Archiș locality, the classes of favorability and suitability of the soils were established for the main categories of use and species of cultivated plants. Simultaneously, the limiting factors that influence the growth and development of cultivated plants, and their intensity and the measures to prevent and limit their effect on agricultural production were identified. The area taken into account and its zonal peculiarities, determining a great diversity of ecological conditions, generated by the variability of the factors that compete to create the environment in which plants grow and achieve production. It is presented in more detail, the composition of the soil cover, some restrictive characteristics of the quality and suitability of land for certain agricultural uses, with requirements and specific improvement measures and the favorability of arable land for the main cultivated plants. Considering these, the paper presents a series of data prepared on the basis of the existing pedological information in the OSPA archive.*

**Keywords:** *resources, soil, land, agricultural, fertility*

### INTRODUCTION

Soil is a natural body with its own organization, modified or not by human activity, which forms and evolves over time, on the surface of the earth's crust, under the action of bioclimatic factors on the parent material or rock. It is characterized by a specific triphasic composition (solid, liquid and gaseous), porous polydisperse composition of the solid phase, vertical composition differentiation, the presence of the living component, uninterrupted and complex dynamics, ability to be fertile, etc., which besides its ability to historical-natural body, represents the environment in which food is produced for everything that lives on our planet, whether it is represented by land or submerged.

The land is an area of land contained within certain limits characterized by a set of specific environmental conditions on which its favorability depends, for certain cultivated or spontaneous plants, the way of use, management and protection, etc.

Fertility is the ability of soils to provide plants with nutrients and water simultaneously and permanently, in conditions sufficient for the physical and biochemical needs necessary for the growth and development of plants, in the overall satisfaction of the other vegetation factors.

In the modern, detailed definitions given to the soil, fertility is systematically defined as a result of the stage of soil formation and evolution, its composition and properties, as well as the biochemical processes that take place in the soil.

The knowledge of the production capacity of the land is conditioned by the detailed knowledge of the correspondence between the physiological requirements of each individual

species and the characteristics of the biotope, taking into account the fact that agro-ecosystems are spatio-temporal formations that function like cybernetic systems, constantly carrying out substance exchanges , energy and information, both between phytocenotic and zoocenotic elements, as well as between them and the environment and having the ability to transform cosmic energy into energy potential, which it stores in vegetable and animal biomass.

#### MATERIAL AND METHOD

The cadastral territory with an area of 6807 ha, of which 2294 ha (33.70%) is agricultural land, 4329 ha (63.60%) being occupied by forests is located in the north of the Sebiş Depression, at the foot of the Codru -Moma Mountains, with varied landforms and a developed hydrographic network.

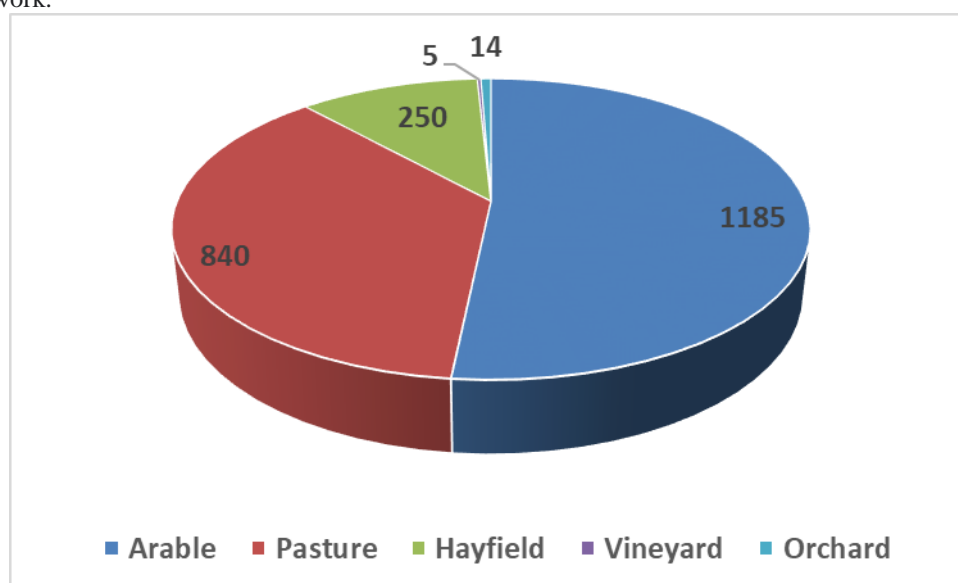


Fig. 1. Land categories of use from Archis (ha)

In close correlation with the variety of geomorphological factors that determine the existence of diversified relief units, the geolithological ones, which led to a great diversity of parental materials, climatic or hydrological ones, as well as various anthropic interventions.

The object of the study is the soil surfaces in the Archis area, Arad county, identifying the types of soil, the physical, chemical and morphological properties, respectively the quality classes for the categories of use arable, pastures and pastures.

The research of ecopedological conditions was carried out in accordance with the "Methodology for the elaboration of pedological studies" (vol. I, II, III) developed by ICPA in 1987 and the Romanian System of Soil Taxonomy (SRTS 2012) developed by ICPA Bucharest in 2012 , completed by the methodological norms.

## RESULTS AND DISCUSSIONS

The northern part of the considered space corresponds to another model regarding the arrangement of the main relief forms, the one specific to the Crisana region, in which lower spaces, like the gulf depressions, are interposed between the mountain areas, in contrast to the relief of the Banat which takes place in the south de Mureş, in the form of a grand and harmonious amphitheater, open to the northwest, but both are subject to a permanent transformation, both under the influence of natural factors and under the influence of anthropogenic factors that have modified it to a more significant extent.

North of Mureş, the space under consideration is dominated in the east by the heights of the mountain units represented by: the Bihor Mountains, the Codru Moma Mountains and the Zarandului Mountains, the mountain area being connected to the plain by a chain of peripheral hills between which it penetrates structured in the form of bays to the base of the mountains, the large relief units being: the Codru Moma, Zarandului and Bihorului Mountains, the Cuiedului and Codrului Moma Hills, the sub- and intramontane depressions, the Piedmont plains and those of subsidence and digression, as well as the meadow of Mureş and Crişu Alb.

The central and south-eastern sector is made up of volcanogenic, sedimentary formations, diabase flows, alternating with tuffs, phyllites, conglomerates, sandstones, argillaceous-violet shale.

Archiş commune is located in the northern part of Arad county, at a distance of 86 km from Arad and 138 km from Timișoara, being formed by the villages of Archiș (residence), Bârzești, Groșeni and Nermiş.

The first documentary attestation of the Archiș locality dates back to 1552, with the following names at the time: Belarkos, Arcașii lui Menumorut, Archăș. It has origins in much more distant times, on the radius of the commune, the traces of a Dacian fortress were discovered, below the peak of Pleșu, then it was part of the Beliu fortress ruled by voivode Menumerut and later by Mihai Viteazul, while the spatial configuration of the villages did not undergo too many changes, the systematization actions initiated by Maria Tereza did not reach these lands.

A specific feature of the area is that compact forest areas occupy the entire mountain area (hence the name "Codru"), which gives the region the specific character of a very little transformed forest mountain landscape, a fact for which the Moneasa Mixed Nature Reserve was established on an area of 6273 ha which represents one of the last karsts in Europe.

From a geological point of view, the researched perimeter rests on a hard Carpathian foundation formed by Paleozoic and Mesozoic crystalline rocks immersed in the Tortonian, fragmented in different directions by a system of tectonic faults, it has a geological composition of great petrographic variety. Thus, in the Codru Moma and Zarand Mountains, paleozoic crystalline schists are found, accompanied in places by paleozoic granites and granitoid rocks and Permian sandstones. Mesozoic rocks occupy limited areas.

From a tectonic point of view, within the perimeter we distinguish higher units in the form of horsts (Codru and Zarand) themselves structurally and tectonically complicated and lower units (depressions, gulfs, etc.) resulting from the fragmentation and erosion of the initial unitary block.

The network of flowing waters that organizes its hydrographic basins within the radius of the considered space belongs to the Danube basin, being the direct tributaries of the Tisza: Mureş, Crişul-Alb.

The climatic peculiarities of the Codru Moma Mountains area are determined by their geographical position within the European continent, which is characterized by a certain circulation of air masses of various types, circulation imprinted either by action centers of dynamic origin (Azoric and subtropical anticyclone) , or by the centers of seasonal thermal action (Siberian anticyclone, Asian or Mediterranean depression).

The average annual temperature is approximately 10.5°C, with minimums in December-January (10-23°C) and maximums in June-July-August (20°-38°C). The lowest average annual temperature was recorded in 1966 (9°), the lowest average monthly temperature was recorded in January 1964 (-8.8°), and the multiannual average precipitation being 661.1 mm in Archiș (fig.2.).

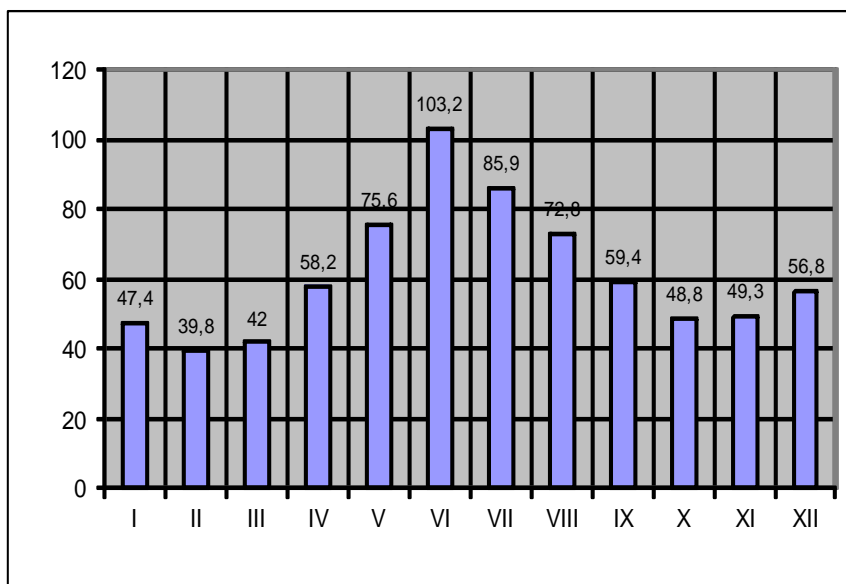


Fig. 2. Archiș (Altit.167 m), average monthly and annual precipitation (mm).

The floristic particularities are highlighted both by endemisms and by the thermophilic, southern elements, present in a remarkable number, giving the immoral and practical vegetation a mosaic, specific shade, which is why the flora of the researched space falls within the Eastern Carpathian province.

The vegetation is characterized by the predominance of zonal formations of forest-steppe and forest with a strong anthropogenic transformation of the natural vegetation, only a small part being represented by natural vegetation proper, or very little transformed (this includes the forest floor, pastures and meadows in the hollows alpine).

The vegetation of the commune falls within the area of mountain vegetation, consisting of gorun forests mixed with mountain ash and sky.

The meadow vegetation consists of a number of characteristic herbaceous and woody species: willows, poplars and alders.

On the highest step, coniferous forests of spruce, pine, fir and Douglas fir are planted.

Among the shrubs we find juniper, blackberry, raspberry, blueberry, the last three listed shrubs being an important source of income by picking and utilizing their fruits.

As a basic component of terrestrial ecology, the edaphic cover constitutes one of the most important elements of the environment, being in a close interdependence with the plant cover. As an open ecological system, it is in a close relationship

with the elements of the environment, from the immediate vicinity, a continuous flow of matter and energy, the phytocenoses acting on the soil both directly and indirectly, the soil cover presenting a stepwise arrangement, of la is to the west as is the relief or climate.

In close connection with the variety of geomorphological factors that determine the existence of diversified relief units, the geolithological ones, which led to a great diversity of parental materials, climatic or hydrological ones, as well as various anthropic interventions within the researched space, the current edaphic cover is represented by: luvosols, alluviosols, preluvosols and anthrosols, (Fig. 3) which reflect, through their geobiochemical and morphological properties, the main defining and determining characteristics for the growth and fruiting of the main cultivated plants, expressed through credit notes, based on whose lands were classified in quality classes, from I to V for the arable surface of 1185 ha, respectively the surface with pastures of 840 ha (tab. 1.).

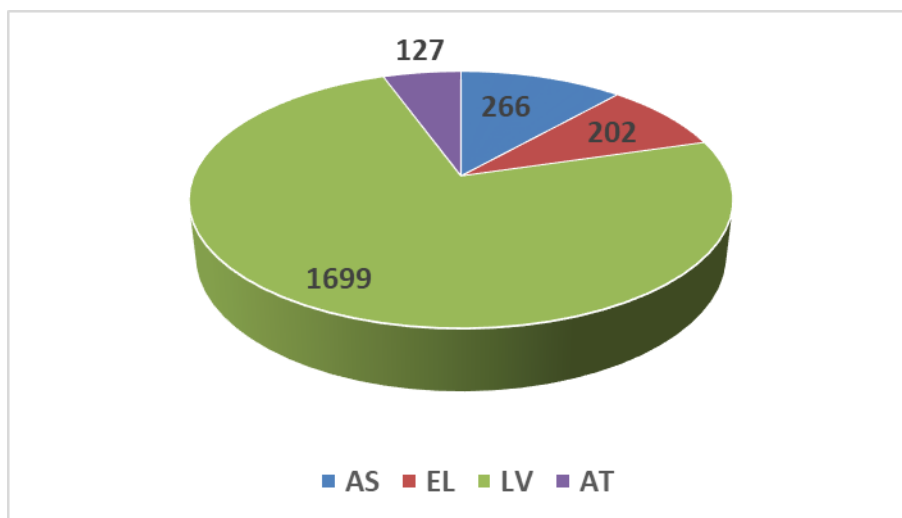


Fig.3. Soil types in Archis locality, Arad county.(ha)

Table 1.

Quality classes for ARABLE and PASTURE use category (ha).

Category of use	Surface	Class I (81-100 pct.) ha	Class a II-a (61-80 pct.) ha	Class a III-a (41-60 pct.) ha	Class a IV-a (21-40 pct.) ha	Class a V-a (1-20 pct.) ha
Arable	1185	-	110	241	364	470
Pasture	840	7	131	395	245	62

Although as a geographical space the researched area is located in not too different bioclimatic conditions, however, due to the variation of the lithological and hydrological conditions, the solification processes differ from one place to another, determining an increased variability of telluric-edaphic factors, which compete to create the environment in which plants grow and yield, the action over time of natural factors (relief, rock, climate, hydrology, etc.) as well as human intervention that began with the elevation the first earth waves, since the pre-Roman period and continued, later, with the hydro-ameliorative works (ca. 250 years ago) influence over time the ecological capacity of the researched space.

In the conditions of a good natural ecological potential, at first glance, the soil quality situation is still below the level of expectations, since most of them are affected by the existence of one or more limiting or restrictive factors, even if the area has been subjected, since the very beginning, of much more intense anthropogenic interventions than in other territories within Arad County.

The limiting factors that affect the potential of the soil cover in this area refer mainly to limitations due to excess stagnant and phreatic moisture, the degree of compaction and soil acidification.

Table 2

The limiting factors in Archis area (ha)

Limiting factors	Low	Moderate	Strong
excess surface moisture	140	810	99
excess phreatic moisture	120	110	-
settlement	100	300	1594
acidified	677	911	450

### CONCLUSIONS

The territory of Archiș commune falls within the temperate continental climate zone, with slight Mediterranean influences.

Under the conditions of a good natural ecological potential, at first glance, the soil quality situation is still below expectations, since most of them are affected by the existence of one or more limiting or restrictive factors.

The limiting factors that affect the potential of the soil cover in this area refer mainly to limitations due to excess stagnant and phreatic moisture, the degree of compaction (settlement) and acidification of the soil, a fact for which they are required, on a case-by-case basis, pedo-hydro-ameliorative measures (drying, drainage, deep loosening, etc.) to achieve a balanced aero-hydric regime and measures aimed at favor the development of the processes of concentration of nutrients and organic matter in the soil (ameliorative fertilizations, long-term crop rotations with ameliorative plants from legumes and perennial grasses, etc.).

In order to prevent physical degradation, it is necessary to reduce the land preparation works to a minimum, carrying out agrotechnical works only at the optimal soil moisture, and to eliminate or reduce the limiting effects, the agro-pedo-improvement works will mainly aim at improving the aerohydric regime of the soil through measures to capture and drain rainwater, as well as measures to prevent compaction, associated with those to improve the plant nutrition regime, by applying amendments and ameliorative fertilizations (amendment dose, type and amount of fertilizer to be established on the basis of agrochemical maps, in relation to the use of the land and the cultivated plant), preventing and combating soil erosion (current cultural works, strip crops, earth waves, furrows, coastal channels, anti-erosion curtains).

Considering the weight of non-agricultural lands (forests, thickets, reeds, water glosses, non-productive lands), as well as the pedoclimatic conditions specific to the area, which allow the development of a rich and varied honey flora, to increase the floristic potential with quality sources it is recommended to improve the floristic composition with species such as: *Tilia tomentosa*, *Tilia cordata*, *Robinia pseudacacia*, *Corilus maxima*, etc.

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