THE PHYSICAL - GEOGRAPHICAL CONDITIONS AND THE QUALITY OF SOILS FROM VINGA PLAIN

Saida FEIER-DAVID, D. ȚĂRĂU, Gh. DAVID, D. D. DICU

University of Life Sciences „King Mihai I" from Timisoara
Coresponding author:danieldicu@usvt.ro

Abstract. *The work provides information and elements related to the classification and evaluation of soil resources, thus integrating into the field of complex studies of natural resource identification, from the perspective of the land's vocation for the most suitable utility and the establishment of protection and conservation measures for the lands in the area. The objectives of the work are represented by the collection, processing and accumulation of scientific data related to environmental factors, the geographical characteristics of the area, soil resources, data related to the nature and intensity of the limiting factors, the qualitative evaluation of the lands. The object of the study activities is the land with an area of 205991 ha, of which 174576 ha (84.75%) are agricultural land (144153 ha, respectively 69.68% being arable land) and 10941 ha (5.31%) lands with forest vegetation, located south of Mureș, west of the Lipova plateau, north of the Bega-Timiș subsiding area and west of the Giucoșin-Aranca subsiding area in the Piedmont Plain of the Vinga subhill glacis, a component of the Mureș Plain. From an administrative point of view, these lands belong to a number of 22 territorial administrative units (UAT), of which 13 in Timiș county and 9 in Arad county.Soil properties can exert a decisive influence on the development of the root system, mineral nutrition, providing air, weather and climate for the main physiological processes from plants, acting on fertility (quality) status of soil. Systematic mapping and agrochemical studies of soil provide valuable data on the state of soil quality, establish and implement differentiated culture technologies and determining the suitability of land for various crops, substantiation of land improvement works and improvement technology, organization and systematization of land.*

Keywords: *land, quality, favorability, limiting factor*

INTRODUCTION

The quality of the land (soil), in the sense of the Romanian school of pedology, represents the totality of the essential properties and particularities (defined from a topographical, geological, geomorphological, pedological, agrochemical, etc.) point of view by which a certain portion of land on the Earth's surface is it differs from the others, being better or worse (D. Teaci, 1980).

In FAO terminology, "land quality" is defined as a complex of factors that influence the sustainability of land for the proposed purposes, the term "land" referring to: soils, landforms, climate, hydrology, vegetation and fauna, also including land improvements and other forms of management, etc. (Fleischhauer and Eger, 1998, cited by M. Dumitru, 2002).

Due to its location, in the middle of the northern hemisphere between 44°27' - 47°35' north latitude and 20°15' - 22°52' east longitude, the natural conditions (relief, lithology, hydrology, vegetation) are specific to a high plain , where the main soil types were formed and evolved, which reflect, through their geo-biochemical and morphological properties, the main defining and determining landscape characteristics for the growth and fruiting of the main cultivated plants.

MATERIAL AND METHODS

Considering these considerations, the paper presents a series of processing/adaptation data from the work "Lands and places between the Danube-Vârful Gugu-Crișu Negru", D. Țărău et al, 2019 prepared on the basis of the existing pedological information in the OSPA archive from

Timișoara, in the largest one on classical support, as well as on the basis of the SPED1 informational system and the BDUST-B system (ICPA Bucharest), but also on the basis of the research carried out over time by the authors (within OSPA, USAMVB), some aspects regarding to pedoclimatic characteristics as elements that define soil quality in order to ensure, to land users, specialized support for the development of sustainable management programs of renewable natural resources (soil, water, biodiversity).

The object study activity it is constituted by the lands with an area of 205991 ha (tab.1), of which 174576 ha (84.75%) are agricultural lands (144153ha, respectively 69.68 % being arable land) and 10941ha (5.31%) lands with forest vegetation, located south of Mureș, west of the Lipova plateau, north of the Bega-Timiș subsidence area and west of the Giucoșin-Aranca subsidence area in the Piedmont Plain of the Vinga subhill glacis, part component of the Mureş Plain. From an administrative point of view, these lands belong to a number of 22 territorial administrative units (UAT), of which 13 in Timiș County and 9 in Arad County.

The space 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 produce crops.

Table 1

The situation of the land fund

No.	ATU	Arable	Pasture	Hayfield	Vineyards	Orchards	Totall agricultural	Forest	Water	Other categories	TOTAL
1	Dumbrăviţa	543	50	1	1	1	596	1	46	1255	1898
2	Fibiș	3853	669	474	0	54	5050	59	19	181	5309
3	Ghiroda	2241	338	218	3	12	2812	5	125	471	3413
4	Giarmata	5977	54	148	60	292	6531	16	86	517	7150
5	Masloc	5175	1120	507	0	163	6965	983	27	316	8291
6	Ortisoara	11610	1558	524	2	74	13768	57	112	626	14563
7	Pischia	7203	1206	513	285	489	9696	1963	188	514	12361
8	Recaș	12121	4736	982	1589	230	19658	1810	403	1117	22988
9	Remetea M	4815	903	163	61	14	5956	586	199	548	7289
10	Satchinese	8027	575	314	2	7	8925	10	482	571	9988
11	Sanandrei	6986	1002	233	1	5	8227	2. 3	171	819	9240
12	Topolovațu M	6772	1688	212	28	228	8928	343	236	481	9988
13	Varias	9519	693	154	0	0	10366	0	148	653	11167
Total TM (ha)		**84842**	**14592**	**4443**	**2032**	**1569**	**107478**	**5856**	**2242**	**8069**	**123645**
1	New Arad	9099	1024	69	0	0	10192	599	330	4451	15572
2	Fantanele	3227	269	129	0	0	3625	90	110	304	4129
3	Candle	4004	166	4	1	11	4186	429	25	320	4960
4	beauty	3721	354	28	0	0	4103	167	59	121	4450
5	Sagu	8346	649	293	73	0	9361	63	40	814	10278
6	Secession	10060	898	166	0	0	11124	1601	428	818	13971
7	come	12214	377	670	0	0	13261	91	157	1171	14680
8	Zabrani	6573	1455	221	230	594	9073	1965	184	556	11778
9	Vain	2067	80	24	1	1	2173	80	32	243	2528
Total AR (ha)		***59311***	***5272***	***1604***	***305***	***606***	***67098***	***5085***	***1365***	***8798***	***82346***
TotalTM+AR (ha)		**144153**	**19864**	**6047**	**2337**	**2175**	**174576**	**10941**	**3607**	**16867**	**205991**
% total area		69.98	9.64	2.94	1.13	1.06	84.75	5.31	1.75	8.19	100
% of the agricultural total		82.57	11.38	3.46	1.34	1.25	100	-	-	-	-

This is the oldest and most complex, from a geographical point of view (Posea, 1997) and was formed by the divergence of glacis intensely shaped by a secondary network of running waters and valleys at an elevation between 95-200 m, compared to the reference level. The integrated part of the Southern Mureș Plain (Mihăilă et al., 1990, cited by Stela Uruioc, 2002) has the appearance of a stepped Piedmont plateau, distinctly detached in altimetric, geomorphological and structural terms from the plains in the north of Mureș and the Lipovai Hills in the east.

It dominates the Low Rampage Plain by 20-40 m and is dominated by the Lipova piedmont by 40-60 m (Stela Uruioc, 2002).

Its relief is presented in the form of a succession of high, almost flat fields, whose altitude decreases from east to west, separated by wide, quite deep valleys, most of them without permanent drainage.

The slopes of the erosion valleys are, most of the time, pronouncedly inclined due to the lithological structures, but they have a stable profile (slides or collapses are encountered in isolation).

The interfluves are well individualized, very wide, from 1 km in the east to 5 km in the west, with the appearance of suspended fields.

The origin of the Vinga Plain is attributed to the great Pleistocene delta of Mureş, which opened here, towards the Pannonian lake, at the beginning of the Quaternary. The deep deposits indicate an alluvial-torrential formation, with gravels and sands alternating with clays and loams, the thickness of the gravels and their genesis of Mureş cones reinforcing this fact. The superficial cover consists of loessoid deposits deposited in different phases, interspersed with fossil soils.

The major relief of the Vingăi plain represents the most typical morphological piedmont of the terraced piedmont plain type with local tectonic influences from the entire Western Plain, within it, one can observe some terrace-piedmont steps with smooth transitions, generally without obvious fronts, connectable safely in terraces (Posea, 1988).

The Vinga Plain presents four altitudinal steps, located in the fan, made by Mureş in different stages, as well as the local tectonic influence, especially by the hidden locality Luda - Bara, which produced a vaulting, in the east, a radially circular, asymmetrical hydrography and a similar fragmentation of the plain, thus forming towards the Lipova Plateau two convex and elongated interfluvial fields NE to SW and others almost radially circular, deflected to the SW (Posea, 1997).

Bizerea (1973), considers these steps more tectonic and distinguishes five levels: Seceani (180 m), Alioș (160 m), Vinga (150 m), Calacea (130 m), Satchinez (100 m).

Extending to the south of Mureș, between Lipova and Secusigiu (Satu Mare), the northern limit is given by the Mureș meadow, also imposed by a subsiding area. The eastern limit to the Lipova Plateau is marked by an unevenness of 40-60 m, between Lipova and Maşloc, the limit altitude oscillating between 180-190 m (below the patches of terrace 5 that remain in the plateau at 200-220 m, Posea 1997) and more then by Beregsău (right slope), until Sânandrei.

On the left of Beregsău, the plain penetrates through meadows and low terraces on the valleys that descend from the Lipova Plateau (Beregsău and Băciu), in the SE corner meeting the glacis - terrace on the right of Begăi. In this area, the limit is more difficult to establish because the Lipova Plateau descends smoothly towards Bega, in glacis-terraces with a hilly appearance, the limit following altitudes lower than 160-170 m.

Between the terraced plain of Begă (Câmpia Lucareţului) and the Vingăi Plain, the conventional limit can be drawn on the Ghertiamoș valley, between Ianova and Remetea Mare (where a NS fault also seems to pass, Posea 1997).

In the south, towards the Timiş Plain, the border follows the curve of 100 m, in some places even 95 m. Although the altimetric difference makes the border less noticeable, in general there is an unevenness of 15-20 m and locally of only 3-5 m unevenness achieved by the displacement of the wandering beds of the semicircular hydrographic collectors of the Vingă Plain, after their penetration into the subsiding plain, i.e. Beregsăul (between Cernăteaz and Sânandrei) and Apa Mare (with Surducul and Valea Apei).

The respective watercourses, plus some (coastal) springs from its connection to Câmpia Joasă, created frequent ramifications and swampy areas on the entire southern and southwestern border, up to the north of Mureș.

The wanderings of the waters at the southern border (the Surducul flowed into Beregsău before regularization), but also the local subsidence seems to have isolated some patches from the Vingăi Plain to the Timisoara Plain, such as those from Becicherecul Mic – Dudeşti Noi (90-96 m) and southwest of Dumbrăviţa (96-100 m).

In the west, the limit still drops to 100 m, locally even below, but the unevenness is often more blurred, still remaining evident due to the swamps and water courses that wander at the junction between the Vingăi Plain and the Low Plain.

Here two sub-sectors can be singled out, a northern one with a width of about 2 km (between the Mureșului meadow and the Cirici Mound), which connects to the Galaţcai Plain through altitudes of 95 m to the east of Periam, then decreasing to 90-85 m, and in some mounds at 98-104 m. Then follows the sector a little lower that makes the connection to the Grabați-Bulgăruş Plain with altitudes of 90-85 m.

To the north, the limit is given by the Mureș meadow, being imposed here by a subsiding area as well as in the south and southwest. On this alignment, the altitudes decrease from 130 m at Lipova to 95-100 m near Secusigiu (Satu Mare), i.e. approximately the height near Mureș.

Altitudinally, the Vingăi Plain descends in steps from 190 m below the Lipova Plateau, up to 110-100 m in the west and south. It presents an altitudinal maximum of 189 m at Luda-Bara (east of Seceani) in the interior of the Plain and 186-189.5 m northeast of Maşloc (under the forest) at the junction with the Lipova Plateau, the dominant being the altitudes of 100-150 m.

The minor relief of Câmpie Vingăi is made up of valleys with flat bottoms, sometimes with the appearance of ogase, especially towards Mureș, landslides from the slopes bordering the Magherus valley, roofs of different shapes (circular, elongated, renal, lenticular, etc.) and sizes that rarely exceed 0.5 ha, meadow microrelief and anthropogenic relief.

In the northwestern sector of the high plain of Vingă, above terrace III of Mureș, on the alignment Tisa Nouă - Felnac - Secusigiu, the relief is in the form of a plain (Câmpul Zădărlacău) with a horizontal or quasi-horizontal surface, with unevenness that slopes from the east to the west and from south to north, with a general slope of less than 2%. In the morphology of the plain, there are micro-depressions and roofs resulting from the settling of carbonate clays and loess, through the accumulation of meteoric water and the dissolution of the carbonate binder, as well as some fluvial formations often found in abandoned beds and meanders. of water.

The Zădărlacui field, with altitudes between 136-100 m, is found on the Fântânele-Zădăreni-Felnac level. It has the Mureș meadow to the north, to which it is connected by a terrace head with an opening of approx. 50-80 m. To the east, it rests on the Aluniş - Frumuşeni field, superimposed on the dejection cones and the local glacis from Neudorf. To the south it is bordered by the Vinga level, the most typical shape of the high Vinga plain (which has a limit in the north on the line Șagu-Tisa Nouă - Fântânele).

In the west, the Mailat – Călugăreni line connects to Câmpul Felnacului.

Evolution represents, therefore, the effect of a permanent transformation of its structure and appearance, generated during geological time by the confrontation of two sources of energy: one internal, subcortical, which created tectonic bumps and one of external origin, cosmic-atmospheric and telluric-edaphic and/or anthropic, which generated and maintained the action of exogenous factors.

Although it is bounded in the north by the current course of the Mures, the area under consideration is part of the Bega hydrographic basin, the Beregsău sub-basin.

The regime of flowing waters is subject to relatively large level variations. In the upper course, the climatic and orographic conditions give the hydrographic network a high density and an increased flow, compared to the middle and lower, where there are frequent drifting tendencies at the very low flow slope.

According to the grouping at the country level, Mureşul belongs to the western group, and the other courses belong to the southwestern or Banat group (Ujvari 1972).

The Mureş enters the plain after crossing the gorge from Radna-Lipova, having a slope of 0.45-0.35% until Arad, with strong lateral movements and bank erosion. After Arad, the slope drops to 0.22% (Ujvari, 1972), which is why it meanders and diverges, which is why it floods a good part of the neighboring lands during high floods, which is why it was dammed. The dike on the right starts from Mândruloc (east of Arad), and the one on the left from Felnac (west of Arad), but with segments also in Arad.

It has an average flow rate of 170 m3/s in Lipova, 154 m3/s in Arad and 191 m3/s in Nădlac.

During the 1970 flood, the flow rate in Arad reached 2230 m3/s (19.05.1970), being very close to the respective maximum of 2440 m3/s, calculated with a precision of 1% (Posea, 1997). In dry years, the minimum flow was 14.0 m3/s (29.01.1964).

The maximum flows are achieved against the backdrop of spring runoff, with the melting of snow or the increased supply of torrential rains, when in fact there is also the greatest risk of flooding.

The average duration of ice formations is short (20-40 days), and the frequency of ice bridges is low (12-18%).

Another aspect that should be mentioned is the fact that, between Zăbrani and Zădăreni, the Mures meanders strongly and often changes its course during high floods, as well as the fact thatit is the main source of irrigation water for the irrigated areas, served by the SPA Fântânele pumping station from the Fântânele Șagu irrigation system, Arad county (fixed pumping station with 4 submersible electric pumps).

Also, Mureş is the main collector. He receiving on the left side, in the areaFântânele – Tisa Noua, a series of erosion valleys that have an intermittent flow (Valea Mică, Valea Mare, Valea Tisa Noua, etc.) with the exception of the Frumuşeni valley.

The average runoff coefficient obtained, as a ratio between the average runoff of the valleys and the amount of precipitation, oscillates between 0.1-0.3. The maximum values are recorded in winter and spring. The end of summer and autumn represent the periods with minimal leakage. The vast majority of these valleys, drying up during this period.

Bega, the southernmost tributary of the Tisza, flows in the southern part of the researched area, Câmpia Vingăi, resting southwest of Remetea Mare on the left bank of the current course, currently channelized.

Springing from the Poiana Ruscăi Mountains, the course of the Bega River is characterized by a water regime with very large variations in water levels and flows. Under these conditions, both to ensure the water supply of the navigable canal (started in 1728, on a route of the old course and completed in the first phase in 1756), and to protect the Municipality

of Timisoara (after the great flood of 1859), Bega it was connected with Timişul through a system consisting of two canals.

This is how the hydrotechnical node from Costei was designed and built, with the main function of ensuring the transfer of water quantities from Timiş to Bega, depending on the needs and the amount of precipitation, taken from the two upstream rivers, and through the hydrotechnical system built at Topolovăţul Mic was removed from the danger of floods, so frequent in the past. The surplus water registered by Bega being directed towards the Timiş river.

After leaving the territory of our country, the Bega flows into the Tisa at Titel, in Serbia, but before that it also receives the waters of Bega Veche (Beregsău).

The actual hydrographic network of the Vinga Plain consists of Beregsău (Bega Veche) which receives Băciu from the right, and Măgherus and its tributary Ludabara from the left, and then Valea Lacului and Apa Mare.

Apa Mare has the following tributaries: Surduc, Carani cu Iercici (which flows to Călacea-Băi). Ardelenilor Stream (near Vinga), and on the right Slatina or Sisco Valley (near Satchinez) and Pâmtan Alb united with Valea Apei, also called Ier. Both with springs in the western edge of the Vingăi Plain.

The hydrographic structure is characterized by the existence of two parallel streams located in the east (Beregsău and Măgherus), and the rest are radial valleys, which start from under the Luda-Bara vault. The whole network being attracted, however, by the subsidence in the north of Timisoara, forming a collecting semicircle (Beregsău - Apa Mare - Pământ Alb - Valea Apei).

Old Bega, represents the unchannelized lower course of the Bega, which in turn constitutes a permanent adaptation within the subsidence plain, to the old courses of Timiş, Bega and even Mures.

Its source became the Beregsăul, which descends from the Lipova Plateau and gathers most of the waters of the Vingăi Plain, including the Măgherus with its tributary Ludabara and the Băcinul (from the Lipova hills). Added to these are a series of erosion valleys, which for most of the year are devoid of water.

Beregsau it passes through the east of the localities of Fibiş and Pişchia, the south of the locality of Cernăteaz and after joining the Măgherus valley (both seem to have been installed on the old courses of the Mureş) flows into Bega Veche. The current course of the Beregsău is regularized and channelized, which limits the flooding of the neighboring areas.

Before Pişchia, Beregsăul receives the Băcin stream on its left side, which has a variable flow depending on the season and the rainfall.

The Magherus (also known as Matca) collects its waters from the Aluniş - Alioş platform at an altitude of 153 m, approx. 3 km from the Mures meadow

It has a permanent course, but the flow is fluctuating, being largely dependent on the amount of precipitation that has fallen in the area. In rainy autumns and springs, the entire meadow is flooded. The stream fixed its course on a tectonic line, which causes the appearance of a series of mineralized springs and mud volcanoes (Forocici).

Its current course, also regularized and channelized, was dammed upstream of the Murani locality, forming a reservoir. The created dam allows the flow to be regulated, protecting the downstream agricultural lands from flooding.

From the Seceani platform, the Luda-Bara stream collects its waters, an important tributary of Măgherus, which, after crossing the village of Murani from north to south, flows for a long time from NW to SW almost parallel to Măgherus.

On the border between the Giarmata and Remetea Mare communal territories, flows the Luchinul, which collectsin the waters of the Vingăi High Plain, Ianova area.

In the south-eastern part of the researched perimeter flows (on an old arm of the Begă) the Niaradul, which collects its waters from the Giarmata area. These waters, in the not-too-distant past, were heavily polluted with manure from the Avicol Giarmata plant.

The Ortisoara and Calacea area is drained by the Iercici stream. With a micro-meadow with openings often of 200-300 m, the Iercici stream has a very winding course, currently being regularized and channelized.

In the western part of the Calacea locality, the area is drained by Apa Mare, a valley that collects its waters from below the Luda Bara peak.

Around the town of Carani, the waters are collected by Valea Surducului, and the waters around the town of Cornești are collected by Valea Lacului.

Then follows a series of valleys, which, from the springs to their discharge in Beregsău, change their flow direction several times.

Big Water, which originates on the territory of Fiscut locality (Șagu commune) and which, from its entrance into the border of Vinga commune, to the place where the Arad - Timișoara road crosses, presents a well-drained valley. From the road to the hearth of the Vinga locality, there are poorly drained and mostly swampy portions, and from here to the communal road leading to Secusigiu, it becomes a vast marshy area with marshy grass.

To the south of the village of Vinga, towards this valley, the Ardelenilor Valley and the Zorilor Valley converge.

Ardelenilor Valley It collects its waters from an area located between Firiteaz and Hunedoara Timișană and enters the cadastral territory of Vinga commune through its eastern part and flows for a while almost parallel to the Mare apa, then bypasses Vinga inner-village, through the southeastern part and unites with Valea Zorilor, so that together they flow (Zona Râtu Mare) into Apa Mare. Further, their course being regularized and canalized.

Valley Zorilor, also called the Popilor valley, located south of the Ardelenilor Valley, gathers its waters under the Seceani platform. It has a semi-swampy and marshy character, being used as hay.

To the south of the inner city, Vinga joins Valea Ardelenilor, before DN Timișoara - Arad, and after it, it makes the junction with Apa Mare.

Slatina Valley, also called Valea Dvorin, after gathering its waters between Cruceni and Tisa Noua (Șagu commune), enters the cadastral territory of Vinga from the north-east, then deviates to the south-west passing through the hearth of the village of Mănăștur, towards Bărăteaz.Due to the vegetation formed*from mesophilic species mixed with specieshalophiles, grazingUmfrom this sector, lamb meat andmutton lointhey get an inimitable flavor and that's why they are highly sought after by connoisseurs of the kitchen.*

After Bărăteaz, south of the hearth of the village, Valea Slatina joins the Apa Mare and has a marshy and semi-marshy character.

Sicso Valley, after gathering its waters from the Mailat area, flows towards the west, southwest direction. Its course was dammed forming a reservoir that is a source of water for local irrigation and at the same timeacting as a fishery.

The climatic peculiarities of the researched area are determined by its geographical position, so it is characterized by a temperate-continental climate with shorter and milder winters, frequently being under the influence of cyclone activity and air masses that cross the Mediterranean Sea and Adriatic(Berbecel et al, 1979, Mircov, 2015), its general features being marked by the diversity and irregularity of atmospheric processes.

The multiannual average temperature is between 10.4oC (Arad) and 10.8oC (Timišoara), and the multiannual average precipitation between 593.5 mm (Arad) and 602.0 mm(AfraidMiss).

The wide spectrum of microrelief forms and the interference of altitude factors with orographic and morphogenetic ones generated a great diversity of microclimatic and edaphic conditions, which favored the development of some Geto-Dacian communities (Remetea Mare, Cenad, from the Iron Age) or proto-Roman and then Romanian (Remetea Mare, Timişoara, Felnac, Arad), mainly concerned with land cultivation and animal breeding.

Thus, the vegetation of the researched space was strongly influenced by the long anthropic activity, which led to the fragmentation of the natural vegetation, it coexists in many cenotic combinations (Arsene 2015) and when it is replaced on large spaces with secondary vegetation of crops and meadows exploited as hay and pastures.

As a result, the potential vegetation that reflects the natural conditions of the researched space is reconstructed based on the currently existing fragments, the local differences and particularities being linked to the specific climate and soils.

The zonal vegetation seems to have been of the type of steppe, silvosteppe and quercine forests, arranged in NS strips.

The climate of the last decades (with precipitation over 550 mm) only indicates the existence of forest-steppe and forest associations, but the presence of typical chernozems in the western part of the researched area also implies the existence of the steppe zone.

The plant groups in the researched perimeter achieve at all spatial levels concrete and faithful syntheses of climatic, edaphic, water and especially anthropogenic factors.

The long-term use of land has continuously led to the decrease of the area occupied by the original spontaneous flora, both in the silvosteppe and forest areas, replacing them with various cultivated species.

Only lands unsuitable for agriculture preserve a vegetal carpet close to the local climate, but with essential differences regarding the components caused by specific ecological conditions.

Thus, the chernozems (typical, cambic, argic), as well as the preluvosols (mollic, stagnant) in the central and eastern part of the researched area are almost completely covered by agricultural crops, on very limited surfaces fragments of the natural vegetation are preserved in the form of clumps of: dovecot (Prunus spinosa), hawthorn (Crataegus manoghyna), rosehip (Rosa canina), heather (Rubus caesius), or fragments of meadows with: pig's hair (Firuta rupicola), thick pear (Cynodon dactylon), sedge (Poa pratensis), etc.

In the agricultural crops, made up of autumn cereals, the vegetation is represented by species such as: gorse (Galium aparine), field grouse (Adonis aestivalis), German gorse (Daphinium causaliola), gorse (Polygonum convolvulus), gorse (Stellaria media), dead nettle (Lamium purpureum), the poppy (Papaver rhoeas), the rapeseed (Sinapis arvensis), the cornflower (Centaurea cyanus), the sosai (Sonchus arvensis), the vole (Convolvulus arvense L.), etc. In the spring crops, you can find species such as: dogwood (Digitaria sanguinalis), gorse (Echinochloua crus-galli), mohor (Setaria gauca), solanum nigrum (Solanul nigrum), bonito (Cirsium arvense L), frog pepper (Polygonum persicaria), stir (Amaranthus retroflexus), cornflowers (Xantium italicum), etc.

In depression areas with hydromorphic soils, with fine texture, distinct structure and defective internal and external drainage, rare clumps of: willows (Salix alba), wicker (Salix cinerea), poplar (Populus alba) can be found.

The grassy carpet consists of species such as: sedge (Poa pratensis), savar (Poa trivialis), foxtail (Alopecurus pratensis), pipirig (Juncus effusus), cock's foot (Ranunculus repens), small clover (Trifolium repens), etc.

In the depressions with soils where water stagnates for a long time, species such as: mint (Mentha pulegium), marsh pepper (Polygonum hogropiper), dogwood (Bialens tripartika), buckthorn (Cyperus flavescens), etc. appear.

The meadows within the researched area are made up, for the most part, of mesophilic species,along the valleys and in the meadows, there are also hydrophilic associations: on the meadows located in the high plains, you can find: sedge (Lolium perenne), fir (Poa pratensis), Bromus sp., golomăt (Dactylis glomerata), hybrid clover (Trifolium hybridum), red clover Trifolium pratensis, Lathyrus tuberosus, Lathyrus pratensis. The pastures are invaded by Xanthium spinosum, Carduus acanthoides, Euphorbia sp.. The grassy associations in the areas with excess moisture located in the bottoms of the valleys in the high plain and in the depressed areas in the meadow are made up of Phragmites communis, Plantago lanceolata, Ranunculus acer, Typha latifolia, Carex ssp., Symphytum officinale, Juncus, Mentha sp., Matricaria chamomilla, etc

Along the roads and near the suburbs, you can find semi-natural meadows with: Festuca pseudovina, Cichorium intybus, Prunus spinosa, Melilotus albus, etc.

The forest is well represented in the north-east and south-west of the town of Pişchia, in the rest of the territory appearing in the form of clumps of sprouts. In general, the forests are made up of species such as: (Quercus petrae), (Quercus pubescens), (Quercus cerris), (quercus farnetto), (Carpinus betulus), (Fraxinus arvense).

In the wide valleys, with groundwater closer to the surface and rainfall from the slopes, clumps or isolated species such as: (Salix alba), (Salix fragilis), (Alnus glutinosa), (Acer campestre), (Populus alba), (Populus nigra), etc.

Living expression of pedo-hydro-climatic and floristic conditions, as well as due to human intervention (starting with the raising of the first earth wavesabout 2500 years BC.and up to now), the soils in the researched area present a great diversity of genetic types of soils in continuous evolution, according to the Romanian Soil Taxonomy System (SRTS-2012), with 13 soil types and associates identified, in continuous evolution (tab. 2).

Table 2

The main types of soil from Vinga Plain

No. for	Unit Administrative territory (UAT)	Agricultural (Ha)	Soil type, subtype												
			AS	CZ	FZ.	EC	HE	IV	Vs	ON	SG	GS	SN	AT	Aso
1	Dumbravita	596	0	303	0	32	255	0	0	0	0	0	0	6	0
2	Fibiş	5050	0	0	0	205	3850	0	358	190	245	92	0	110	0
3	Ghiroda	2812	194	0	0	132	1530	0	315	36	67	200	20	0	318
4	Giarmata	6531	99	0	69	949	3688	0	478	858	98	249	0	43	0
5	Masloc	6965	0	0	77	100	5658	0	380	185	280	86	0	199	0
6	Ortisoara	13768	0	2193	0	0	8444	317	0	0	200	407	0	1007	1200
7	Pischia	9696	27	0	0	999	6893	98	411	115	247	259	0	647	0
8	Recaş	19658	1579	0	29	4618	6521	1460	956	504	410	490	0	3032	59
9	Remetea M	5956	155	0	2007	1114	360	352	300	1144	346	131	0	47	0
10	Satchinese	8925	428	6694	0	0	696	0	54	0	0	643	62	348	0
11	Sanandrei	8227	0	1277	0	552	4301	14	600	0	0	197	29	471	786
12	Topolovăţ	8928	1036	0	24	2344	2911	911	479	0	50	390	0	339	444
13	Varias	10366	278	9469	0	0	0	0	0	0	0	567	52	0	0
Total TM		*107478*	*3796*	*19936*	*2206*	*11045*	*45107*	*3152*	*4331*	*3032*	*1943*	*3711*	*163*	*6249*	*2807*
1	Aradul Nou	10192	999	6291	1566	998	0	0	117	0	0	127	0	94	0
2	Fantanele	3625	197	0	1218	232	1803	0	0	0	0	54	0	121	0
3	Felnac	4186	416	1798	1439	0	268	0	104	86	0	75	0	0	0

4	Frumuseni	4103	219	0	1298	391	1964	0	0	0	0	97	0	134	0
5	Sagu	9361	0	2588	3047	613	2545	0	102	95	0	0	0	371	0
6	Secusigiu	11124	823	6719	0	946	0	0	1213	0	0	1201	222	0	0
7	Vinga	13261	0	8346	876	978	0	0	571	0	0	401	106	1065	918
8	Zabrani	9073	2277	0	51	3025	2903	753	0	0	0	64	0	0	0
9	Zadareni	2173	219	912	760	0	142	0	55	46	0	39	0	0	0
Total AR (ha)		*67098*	*5150*	*26654*	*10255*	*7183*	*9625*	*753*	*2162*	*227*	*0*	*2058*	*328*	*1785*	*918*
Total TM+AR (ha)		174576	8946	46590	12461	18238	54732	3905	6493	3259	1943	5769	491	8034	3725
% of the agricultural total		100	5.12	26.69	7.14	10.45	31.35	2.24	3.72	1.87	1.11	3.30	0.28	4.60	2.13

So, based on the pedological information processed according to the Methodology for Elaboration of Pedological Studies (ICPABucureşti 1987) and other normative acts updated by Order MADR278/2011, the agricultural lands of the researched space can be grouped (from 20 to 20 points) into V classes of suitability (quality) depending on their vocation for arable use (tab. 3).

Pretability, according to the pedology school in our country, representsthe suitability of a land for a certain use and development-improvement works (which highlights the restrictions or limitations that affect the growth of plants, specifying their intensity and nature, respectively the appropriate remedial measures). From this point of view, the lands are divided into suitability classes, from the best and most usable in agriculture to those with no agricultural or forestry value, but which can be used for other purposes.

Table 3

Quality classes for the ARABLE usage category

TERRITORIAL ADMINISTRATIVE UNIT (UAT)	Arable Ha	Class I Ha	Class II Ha	Class III Ha	Class IV Ha		Weighted average grade
Dumbravita	543	245	287	7	4	0	69
Fibiş	3853	20	981	1587	980	285	50
Ghiroda	2241	0	1035	957	229	20	59
Giarmata	5977	128	924	3860	949	116	50
Masloc	5175	78	762	2812	1260	263	48
Ortisoara	11610	1499	5273	3677	594	567	63
Pischia	7203	157	2977	2327	1389	353	54
Recaş	12121	0	1959	4984	3865	1313	42
Remetea M	4815	49	962	2473	967	364	53
Satchinese	8027	4127	2256	664	442	538	70
Sanandrei	6986	317	4026	1918	708	17	64
Topolovăţ	6772	34	2388	2707	1186	457	44
Varias	9519	5255	2700	1199	213	152	74
Total TM	*84842*	11909	26530	29172	12786	4445	
Aradul Nou	9099	180	3141	4012	1040	726	60
Fantanele	3227	120	500	1630	950	27	65
Felnac	4004	135	2197	1500	141	31	69
Frumuseni	3721	115	765	1800	870	171	65
Sagu	8346	2241	2493	2008	1278	326	66
Secusigiu	10060	211	5246	3003	900	700	68
Vinga	12214	892	5859	3851	788	824	65
Zabrani	6573	125	790	3577	1556	525	48
Zadareni	2067	20	960	913	149	25	68
Total AR (ha)	59311	4039	21951	22294	7672	3355	-
Total AR+ TM (ha)	144153	15948	48481	51466	20458	7800	
Total (%)	100	11.06	33.63	35.70	14,19	5.42	

Following the geographical location in the former Mureş delta, at the interference between the low plain and the hills,lithological, hydrological conditions and solification processes differ from one place to another, causing a greater variability of telluric-edaphic factors,the action over time of natural factors and human intervention started from the pre-Roman period with the rise of the first earth waves and continued with hydro-ameliorative works (about 250 years ago), influencing 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 ameliorative interventions much more intense than in other territories in the neighboring areas.

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 (tab. 4.), the degree of compaction (settlement) and soil moisture deficit (tab. 5), salinization and acidification of the soil (tab. 6), for which, on a case-by-case basis, pedo-hydro-ameliorative measures (desiccation, drainage, deep loosening, etc.) are required to achieve a balanced aero-hydric regime and measures aimed at favoring the development 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.).

When evaluating the suitability of the land for cropping systems, at leasttwo determining soil factors, which condition the degree of readiness, namely: the degree of compaction and the excess moisture in the soil.

The mode of distribution and movement of water in the territory, both surface and pedophreatic, its presence in the root system development area, respectively its nature and abundance, its state of mobility and the possibility of oxygenation, its variability in space and time, determine within the researched territory a diverse range of manifestations (tab. 4), offering strongly differentiated living and production conditions.

Table 4

The situation of the lands with excess surface and groundwater moisture in the Vinga Plain

No. crt.	UAT	Total Ha (agricultural)	of which lands with:					
			excess surface moisture			*excess phreatic moisture*		
			weak	*moderate*	*strong; excessive*	*moderate*	*strong*	*very strong; excessive*
1	Dumbravita	596	135	95	-	65	7	0
2	Fibiș	5050	740	1165	690	230	28	95
3	Ghiroda	2812	201	80	-	261	230	235
4	Giarmata	6531	1059	950	596	825	495	250
5	Masloc	6965	1106	1740	1040	340	99	124
6	Ortisoara	13768	1360	820	360	1120	350	415
7	Pischia	9696	1410	1076	506	950	390	260
8	Recaș	19658	3463	2454	750	1165	1845	650
9	Remetea M	5956	1550	1150	510	2560	620	255
10	Satchinese	8925	1420	1387	219	1120	828	750
11	Sanandrei	8227	1690	960	512	1155	720	207
12	Topolovăț	8928	2240	1666	70	880	560	418
13	Varias	10366	1650	1157	20	706	370	587

No. crt.	UAT	Total Ha (agricultural)	of which lands with:					
			excess surface moisture			*excess phreatic moisture*		
			weak	*moderate*	*strong; excessive*	*moderate*	*strong*	*very strong; excessive*
Total TM (ha)		*Total TM*	*18024*	*14700*	*5273*	*11377*	*6542*	*4246*
1	Aradul Nou	10192	1890	1280	-	310	210	127
2	Fantanele	3625	1420	980	-	620	365	54
3	Felnac	4186	250	196	-	140	130	75
4	Frumuseni	4103	1720	1290	-	840	560	97
5	Sagu	9361	1820	1060	-	420	120	--
6	Secusigiu	11124	2590	2120	-	2120	1990	1201
7	Vinga	13261	3160	2980	-	1820	1420	401
8	Zabrani	9073	3280	3050	-	890	980	64
9	Zadareni	2173	120	90	-	110	80	39
Total AR (ha)		*67098*	*16250*	*13046*	-	*7270*	*5855*	*2058*
Total AR + TM (ha)		174576	34274	27746	5273	18647	12395	6304
Total (%)		100	19.63	15.89	3.02	10.68	7,10	3.61

The two forms of manifestations of excess moisture within the researched space together represent limiting factors on an area of 104639 ha, 59.93% (tab.4).

One of the soil properties with an important role in the manifestation of moisture excess and deficiency is compactness.

This one, represents the property of the soil to resist the forces that tend to mechanically break apart the particles that make it up. It is closely related to the granulometric composition, the water content, the humus content and its quality, as well as the nature of the adsorbed cations, being the main ecological indicator that affects the general way of working the soil with agricultural machinery and root penetration plants.

Soil compactness is one of the main physical-mechanical properties, with great practical importance in agriculture. It is expressed by the degree of compactness, respectively, the degree of settlement (GT %) which represents the difference between the minimum required porosity (PMN) versus the total porosity (PT) in relation to the minimum required porosity, calculated with the formula: GT = (PMN- PT/PMN)x100. It is expressed in percentages, establishing the classes of compactness (settlement) of the soil, which show that within the researched space we encounter the following situation: weak, moderate and strong (tab. 5), together representing limiting factors on an area of 135882 ha, 77.83%.

Table 5

The situation of lands affected by compactness, moisture deficit from Vinga Plain

No. Crt.	UAT	Total Ha (agricultural)	of which lands with:					
			settlement			*lack of moisture*		
			LOW	*moderate*	*strong*	*very small, little*	*moderate, big*	*very big, excessive*
1	Dumbravita	596	265	150	180	356	-	-
2	Fibiș	5050	345	426	3366	1578	2116	-
3	Ghiroda	2812	201	2052	151	528	1278	-

No. Crt.	UAT	Total Ha (agricultural)	of which lands with:					
			settlement			*lack of moisture*		
			LOW	*moderate*	*strong*	*very small, little*	*moderate, big*	*very big, excessive*
4	Giarmata	6531	390	5550	340	1990	2710	490
5	Masloc	6965	525	226	6058	2640	3189	-
6	Ortisoara	13768	180	7260	4160	1860	3960	2168
7	Pischia	9696	2885	1760	4210	1960	2890	-
8	Recaş	19658	450	5060	9960	1860	6170	-
9	Remetea M	5956	939	870	3406	2690	-	-
10	Satchinese	8925	1508	1470	1730	1884	2276	977
11	Sanandrei	8227	320	1010	6085	1980	2970	210
12	Topolovăţ	8928	590	1490	1650	3090	2190	1980
13	Varias	10366	4190	3440	1690	1330	6350	-
Total TM (ha)		*Total TM*	*12788*	*30764*	*42986*	*23746*	*36099*	*5825*
1	Aradul Nou	10192	3890	3250	1680	1260	820	-
2	Fantanele	3625	589	2560	180	575	430	15
3	Felnac	4186	50	1180	2880	1270	2363	130
4	Frumuseni	4103	610	3145	190	980	1045	25
5	Sagu	9361	2860	2120	970	1850	1820	-
6	Secusigiu	11124	3280	2260	1080	2120	1910	-
7	Vinga	13261	3960	2680	1120	2890	1520	-
8	Zabrani	9073	3160	2390	1210	1820	1250	-
9	Zadareni	2173	-	590	1460	530	1460	-
Total AR (ha)		*67098*	*18399*	*20175*	*10770*	*13295*	*12618*	*170*
Total (ha)		174576	31187	50939	53756	37041	48717	5995
Total (%)			17.86	29,18	30.79	22.36	27.91	3.43

Seen as a whole, the reaction state of the soils (ind.63), as a result of the dowry and the complex of factors and physico-chemical properties of the soil in its natural development or variously influenced by man, within the researched space, presents the following groups of lands (tab. 6): strongly acidic (4.7 with values between 4.4 - 5.0) in an area of 1077 ha, 0.62%, moderately acidic with values between 5.1 - 5.4 (5, 2) and values between 5.5 - 5.8 (5.6) in an area of 46915ha, 26.87%, slightly acidic with values between 5.9-6.8 (6.1-6.6) in the area of 40309 ha, 23.09%.

Table 6

The situation of lands affected by salinization, acidification from Vinga Plain

No. Crt.	UAT	Total Ha (agricultural)	of which lands with:					
			salinization			*acidified*		
			Low	*moderate*	*strong excess*	*Low*	*moderate*	*strong excess*
1	Dumbravita	596	-	-	-	340	20	-
2	Fibiș	5050	32	--	--	1520	2330	34
3	Ghiroda	2812	40	377	20	1470	330	-
6	Giarmata	6531	940	-	-	1529	1670	70
5	Masloc	6965	-	-	-	1930	2726	-
6	Ortisoara	13768	80	60	-	4550	5650	13
7	Pischia	9696	191	-	-	3195	4370	145
8	Recaș	19658	-	-	-	4280	11720	195
9	Remetea M	5956	10	-	-	2590	2395	16
10	Satchinese	8925	620	506	68	4810	980	-
11	Sanandrei	8227	1050	670	29	2160	3450	135
12	Topolovăț	8928	-	-	-	1230	2518	249
13	Varias	10366	830	760	52	1230	520	-
Total TM (ha)		*Total TM*	*3795*	*2373*	*169*	*30834*	*38679*	*857*
1	Aradul Nou	10192	-	-	-	940	1580	-
2	Fantanele	3625	-	-	-	960	1680	30
3	Felnac	4186	56	71	-	1155	176	-
4	Frumuseni	4103	-	-	-	1150	1790	70
5	Sagu	9361	-	-	-	980	530	-
6	Secusigiu	11124	180	230	222	1060	670	-
7	Vinga	13261	90	120	106	780	480	-
8	Zabrani	9073	-	-	-	1560	1210	120
9	Zadareni	2173	21	19	-	890	120	-
Total AR (ha)		*67098*	*347*	*440*	*328*	*9475*	*8236*	*220*
Total AR+TM (ha)		174576	4142	2813	497	40309	46915	1077
Total (%)			2.37	1.61	0.28	23.09	26.87	0.62

CONCLUSIONS

Knowing the natural conditions and especially the ecological potential of the land (defined according to MESP-ICPA Bucharest, 1987) for the main categories of use and crops, is of particular importance in carrying out the qualitative assessment of the land and the analysis of the limiting factorsand its purpose is to provide agricultural specialists with a global picture of the phenomena taking place within elementary units of the pedological landscape, from which to derive the general strategy regarding the set of ameliorative measures. thus being able to constitute an ecological and efficient solution for the future.

Such a detailed knowledge of the productive and technological characteristics of the favoring, restrictive or limiting factors of agricultural production, both under the current aspect of manifestation, and under the aspect of the real possibilities of changing them for the better

can constitute for the decision-making bodies (government, local administration) a precious tool for achieving the most appropriate practical measures for the production of plant biomass for the benefit of man for the improvement of his living conditions and of the entire community.

Moreover, the appreciation of the quality of life depends on the way in which social needs are satisfied, including here, both the biological, socio-economic ones, as well as those related to the presence of the environment as healthy and as harmonious as possible

BIBLIOGRAPHY

ARSENE GG, 2015, Flora and Vegetation, chapter 4, Historical Banatul Soil-Agriculture-Traditions, XXI Conf. Nat. of Soil Science,.Edit. Eurobit Timisoara.Berbecel O., Cusursuz Beatrice, 1979, The agroclimatic resources of Timiș county, Monographic study, IMN Bucharest.Berindei I., Nedelcu E., 1983, Physical Geography of Romania I- Banato-Crisană Plain -Ed. Academy-Bucuresti.Bizere, M. 1973, Vinga Plain. Studies in the geography of Banat, vol. III, Timisoara,

BORCEAN I., TABĂRĂ V., DAVID GH., BORCEAN EUGENIA, ȚĂRĂU D., BORCEAN A., 1996, Zoning, cultivation and protection of field plants in Banat, Ed. Mirton Timisoara.

DAVID GH., ȚĂRĂU D., ȘANDOR CI, NIȚĂ L, 2018, Soil and climate factors that define land productivity in the lower plain of Banat, Conference Proceedings Volume18, Issue: 3.2, Albena, Bulgaria.

DICU DD, 2010, Evolution of soil fertility and agricultural productivity in a conservative and conventional tillage system, Doctoral Thesis, USAMVB Timișoara.

DUMITRU M., ŞTEFĂNESCU SL, 2000, Agro-environmental schemes in the context of rural development, Soil Science no. 2, vol. XXXIV, Ed. Signata, Timisoara.

DUMITRU M., COLL., 2002, The evolution of the main monitoring parameters of soils and agricultural lands ... CICEC, Bucharest.

FLOREA N., DUMITRU M., CO. ALBESCU I., ASVADUROV N., ...ȚĂRĂU D., 2002, Soil science in Romania in the 20th century, Ed. Book for all, Bucharest.

IANOȘ GH., PUȘCĂ I., GOIAN M., 1997, Soils of Banat (II) natural conditions and fertility, Ed. Mirton, Timisoara.

MIHĂILESCU V., 1966, The hills and plains of Romania, Ed. Șt. Bucharest.

MIRCOV V., 2015, Weather-Climatic Characteristics of Banat, chapter 3, Banat Historical Soil-Agriculture-Traditions, XXI Conf. Nat. of Soil Science,.Edit. Eurobit Timisoara.

MUNTEANU I., 2000, About some aspects regarding the relations between drought, pedogenesis and land degradation (desertification), Soil Science XXXIV, no. 2.

POSEA GR. 1988, The Plains of Romania, with a special look at the Plain-Banato-. Crisene, Terra, no. 3-4.

POSEA GR. 1997, Plains of Romania-Câmpia Banato-Crişană, Bucharest.

ROGOBETE, GH., ȚĂRĂU, D., 1997 - Soils and their improvement. Banat soil map, Ed. Marineasa, Timisoara.

TEACI D., 1980, Crediting of agricultural land, Ed. Ceres, Bucharest.

TEACI D., 1983, Transformation of the natural landscape of Romania, Ed. Şt. and Encyclical. Bucharest.

TĂRĂU D., BORZA I., SÂNEA N., MONICA ANDRU, IRINA TĂRĂU, HORTENSIA RĂDULESCU, BAGHINĂ N., DICU D., IOANA MANOLACHE, DOLOGA D., MARIA ALINA TĂRĂU. MĂDĂLINA IORDACHE, 2007, Results of the research on the evolution of the quality and productivity of the agroecosystems in the Vingă High Plain in the "no-till" culture system, Ed. Eurobit Timișoara.

ȚĂRĂU D., ROGOBETE GH., ADIA GROZAV, DICU D., 2018, Soils from the Southwest of Romania, Ed. Eurobit Timisoara.

ȚĂRĂU D., ROGOBETE GH., DICU DD, ADIA GROZAV, NIȚĂ LD, ILIUTA A.Ș., CLARA MAGDA TUDOR, BERTICI R., 2019,Lands and places between the Danube-Vârful Gugu-Crișu Negru, Ed. Eurobit Timisoara.

ȚĂRĂU D., ROGOBETE GH., FEIER-DAVID SAIDA DAVID GH., 2022, The ecopedological parameters that define the quality of the land, Banat Agriculture no. 1 (150), Ed. AGROPRINT Timisoara,

UJVARI I., 1972, Geography of Romanian waters, Bucharest State Ed.
URUIOC STELA, ŢĂRĂU D., DAVID GH., LĂCĂTUŞU E., 1993, Some considerations on the soils in the contact area of the Vinga Plain - Lipovei Hills (Maşloc-Fibiş Sector), Lcr. University of Timisoara, Geography Series, vol. 2.
URUIOC STELA, 2002, Mineralogy and petrology of soils from the central-northern area of Banat, Ed. Presa Universitară Română Timisoara.
*** SRTS-2012.
*** Methodology for the development of pedological studies, vol. I, II and III, Redaccia de propaganda agricola, Bucharest.