THE TYPOLOGY OF THE SOILS IN THE IAŞI VINEYARD

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Résumét. Le sol constitue l'une des principales ressources naturelles qui conditionne la qualité du fonds foncier. Les sols du vignoble de Iasi se sont formés sous l'influence du climat de sylvosteppe, du relief de collines basses, des rocs, de la végétation ligneuse et herbacée. Les différents types de sol participent par leurs propriétés au développement et à la qualité des produits de ce vignoble. La couverture du sol ne doit pas être regardée seulement comme un nouveau corps naturel apparu sous l'influence des facteurs pédogénétiques, mais aussi comme l'un des premiers moyens de production, car les productions agricoles végétales ne peuvent être obtenues que par son exploitation.

Keywords: *soil type, soil class, soil complex, vineyard*

1. Introduction

Among the natural factors and conditions that constitute the environment in which the process of agricultural production proceeds, the soil, together with the climatic conditions, has a direct influence on this process. Identifying the main soil types within an area is very important, because this enables us to establish the productivity classes of the different soils.

The soil typology within Iaşi vineyard represents the result of reading and interpreting data acquired through complex pedologic studies performed by OSPA – Iaşi (1991, 1992, 1998, 2005, 2008), at 1:10000 scale. Soil classification was done according to the Romanian System of the Soil Taxonomy (SRTS) – 2003.

2. The geographic position and environmental conditions

The Iaşi vineyard is located east - northeast of the Moldavian Plateau, at the contact area of the hilly plain of Jijia with the Central Moldavian Plateau, contact marked by the imposing Coast of Iasi (figure 1).

The problem of the Iaşi vineyard delimitation is quite ticklish because of its placement on the southern frame of the hilly plain of Jijia, at the boundary with the Central Moldavian Plateau (mainly Iaşi Coast).

The main criterion to delimitate the Iaşi vineyard was the land use. Thus, we took into account the land planted with vines that had an area more than two hectares. The geology, the geomorphology, the climate, the vegetation distribution (the conditions of sylvosteppe are favourable for vines; the forest storey is propitious for trees and less for vines) and the soil cover (the cambic Chernozem and the phaeozem are favourable for vines, while the Preluvosols and the Luvosols are less favourable for these cultures) are the other criteria to

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establish the limit of the area undergoing this study. In order to trace out the area of the studied vineyard, we couldn't neglect the traditions to cultivate the vines around the City of Iaşi and the historical affiliation of these vines to this territorial unit.

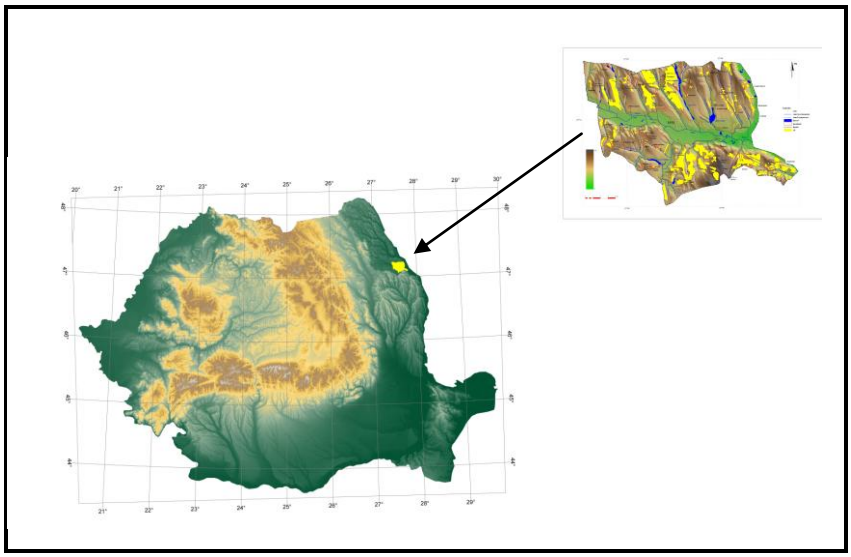

Figure 1: The physical-geographic position of the Iaşi vineyard in Romania

These are the reasons that determined us to establish this limit of the Iaşi vineyard, with prevailing spreading on the southern frame of the hilly plain of Jijia. We have to mention that in Iaşi the average rainfall is 585.8 mm (as of Romanian Meteorological Service ANMH), a very high value, which is not correlated with the soil of chernozem type (station on the inferior terrace of Bahlui). Therefore, the southern boundary of the Iaşi vineyard correlates well with that of the hilly plain of Jijia and the Central Moldavian Plateau.

Considering the established physical-geographic boundaries, an area of 33,756.65 ha has been calculated for the Iaşi vineyard. The pedological charted area was of 19,531.94 ha, the difference of 14,224.71 ha being represented by roads and land with constructions, rivers, lakes and ponds as well as forests.

From a geostructural point of view, the Iaşi vineyard belongs to the central-eastern part of the Moldavian Platform, which is part of the Eastern European Platform, known as the Russian Platform. This vineyard is predominantly situated on a relief dominated by the surfaces of hilly plain type, with an area of transition (Iaşi Coast) to the Central Moldavian Plateau, which is strongly affected by the slope processes. The dominant note of the relief in this area is given by the sculptural character (fluvial-denudational), which occurs due to the monoclynal structure. The sculptural landform complex covers over 50% from the studied area, being represented by the interfluvial ridges and the deluvial slopes.

As for the climate, the Iaşi vineyard has a temperate-continental climate, with a mean annual temperature of 9.4°C (Iaşi) and a multinannual mean value of the rainfall of 540.8 mm (Iaşi). The hydrographical network consists of streams of water with a relatively low flow, the main stream being the Bahlui River.

From a botanical point of view, the area undergoing this analysis has a vegetation of sylvosteppe and at the altitudes above 250 m is presented the forest storey. The forests occupy only the upper part of the coast of transition and the highest plateaus in the south of Iaşi.

3. The soil types

As a part of the natural landscape, the soil formed and evolved in interdependence with and under the influence of specific soil forming factors: climate, geological deposits, ground waters and surface waters, human influence and time. According to Romanian Soil Taxonomy System (SRTS) 2003, in the Iaşi vineyard there have been identified six soil classes (Protisols, Chernisols, Luvisols, Hidrisols, Salsodisols Anthrisols) and 13 soil types.

The soil cover of the studied vineyard is dominated by the soils of the Chernisols class, which represent 52.02% of pedological charted area. In descending order, the soils of the other soil classes own the following shares of the studied area: Protisols –12.18%, Anthrisols–10.45%, Hidrisols–1.80%, Luvisols–1.51% and Salsodisols–0.09%. These classes of soils are accompanied by the complexes of soils in a proportion of 21.95% (figure 2).

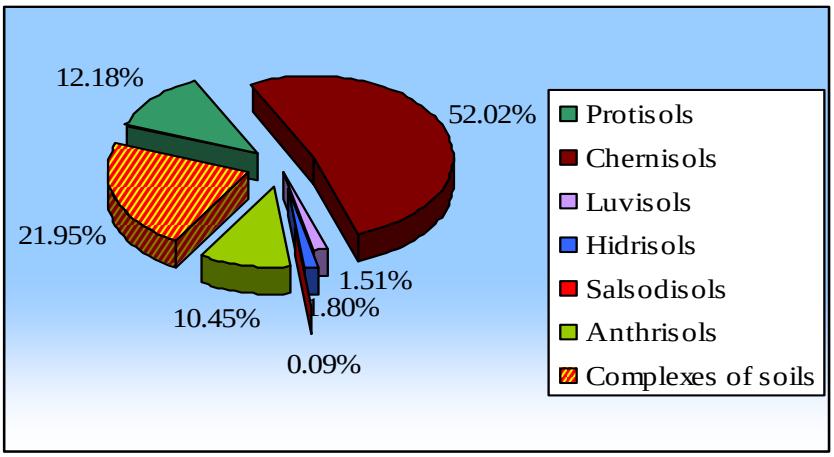

Figure 2: The distribution of the soil classes in the Iaşi vineyard
Data processing after OSPA – Iaşi, 1991, 1992, 1998, 2005, 2008

3.1. The soils of the **Protisols class** are spread in the Iaşi vineyard over an area of 2,377.35 ha. These soils are represented by the Lithosols (12.90 ha), Regosols (143.90 ha), Aluviosols (2019.40 ha) and Entianthroposols (201.96 ha) – table 1.

Table 1: The areas occupied by the soil classes and the soil type in the Iaşi vineyard

Class	Type	Surface (ha)	% of charted area
Protisols		2377.35	**12.18**
	LS	12.90	0.07
	RS	143.90	0.74
	AS	2019.40	10.34
	ET	201.96	1.03
Chernisols		10161.25	**52.02**
	CZ	9718.86	49.76

	FZ	442.39	2.26
Luvisols		294.14	**1.51**
	EL	266.96	1.37
	LV	27.18	0.14
Hidrisols	GS	352.28	**1.80**
Salsodisols		17.20	**0.09**
	SC	7.91	0.04
	SN	9.29	0.05
Anthrisols		2040.88	**10.45**
	ER	551.88	2.83
	AT	1489.00	7.62
Complexes of soils		4288.03	**21.92**
Total surface		19531.94	**100**

The Aluviosols cover the most part of the Protisols class (84.91%) – figure 3, occupying the alluvial plains of the rivers in the studied vineyard (Bahlui, Nicolina). These types of soil are also encountered on the bottom of the narrow valleys, which drain the territory: Lupului Valley brook, Borş Valley, Tomeşti Valley with Tatarca tributary stream, Bogonos Valley, Cacaina Valley, Rediului Valley, Şapte Oameni Valley (Chiriţa tributary stream), Jijia field (in the eastern extremity of the vineyard), Ezăreni Valley, Adâncă Valley.

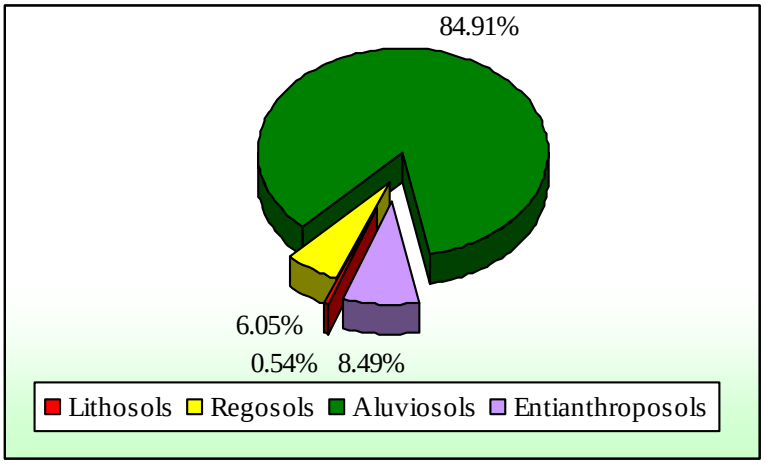

Figure 3: The distribution of the soils from Protisols class in the Iaşi vineyard

In the Iaşi vineyard were identified 22 subtypes of Aluviosols, the gleyic subtype (ASgc) being dominant with 349.33 ha. The large areas are occupied with the sodic-salinic-gleyic-calcaric Aluviosols (ASka-gc-ss) – 201.93 ha and the sodic-salinic gleyic-mollic Aluviosols (ASmo-gc-sc-ac) – 184.28 ha (figure 4).

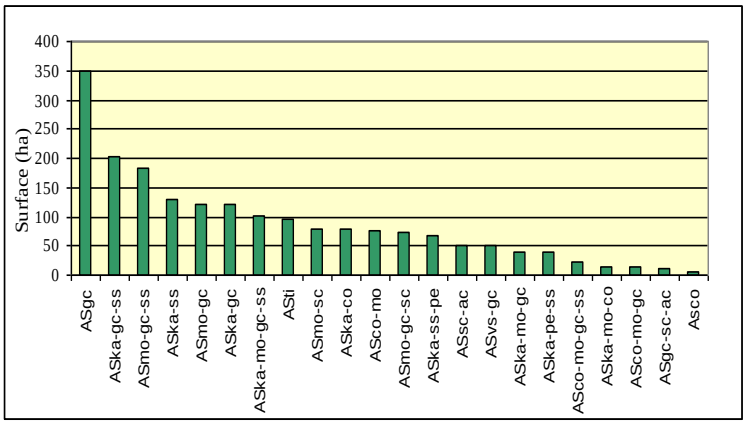

Figure 4: The characteristic subtypes of the Aluviosols in the Iaşi vineyard

The Entianthroposols, with mixic and urbic subtypes, represent 8.49% of the Protisols class (figure 3) and are encountered within the human settlements, but their outside: north of the Lunca Cetățuii village, on the left slope of the Orzeni brook. This type of soil occupies insignificant surfaces within Iaşi, but it is constantly expanding (the mixic Entianthroposols within the Copou wine center).

The Regosols, which own 6.05% of the Protisols class (figure 3), are included in the natural eroded soil category. These soils were formed, mostly, on the cuesta escarpments with northern and western exposition. This type of soil is present to the south of Cârlig. The typical, mollic and rendzinic subtypes are characteristic of the Regosols within Iaşi vineyard. The mollic Regosol (RSmo) is representative of this soil type, because it occupies the largest area (figure 5).

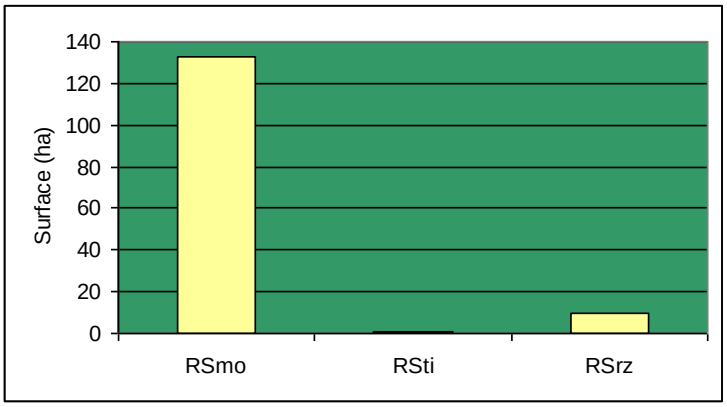

Figure 5: The characteristic subtypes of the Regosols in the Iaşi vineyard

The Lithosols (LS) are encountered on a reduced area (the northwest of the Păun village), occupying only 0.54% of Protisols.

3.2. The **Chernisols class** includes the soils which dominate in the Iaşi vineyard with an area of 10161.25 ha. This soil class consists of Chernozems (CZ) and Phaeozems (FZ). The main forming soil process of these soils is bioaccumulation.

The Chernozems (9718.86 ha) own the biggest part of Chernisols class (95.65%) and also of the whole vineyard (49.76%), being scaterred over the river terraces of Bahlui and Nicolina, the areas of the plateaus and the slopes (these Chernozems are affected by sheet erosion) of Bogonos, Dorobanț, Balan, Trelea hills.

Within the Chernozems were identified 14 subtypes, among which only three occupy representative areas: cambic (CZcb – 6218.84 ha), typical (CZti – 2337.94 ha) and calcaric (CZka – 911.68 ha) - figure 6.

The cambic Chernozems (CZcb) are predominant and were formed on a relatively plane relief, at higher altitudes, the rainfall being somewhat higher (450 – 500 mm/year). The characteristic natural vegetation consists of the rare clusters of oak trees and the grasslands. These chernozems occupy the river terraces of Bahlui and the plateaus (figure 7).

The Phaeozems occupy an area of 442.39 ha and are encountered sporadically on the interfluvial ridges. The mollic and cambic Phaeozems own reduced area (Păun and Trlea hills) and were formed under a vegetation of forest, which was replaced with cultures.

3.3. The **Luvisols class** contains the soils of Preluvosol (EL) and Luvosol (LV) type, occupying an small area of 294.14 ha.

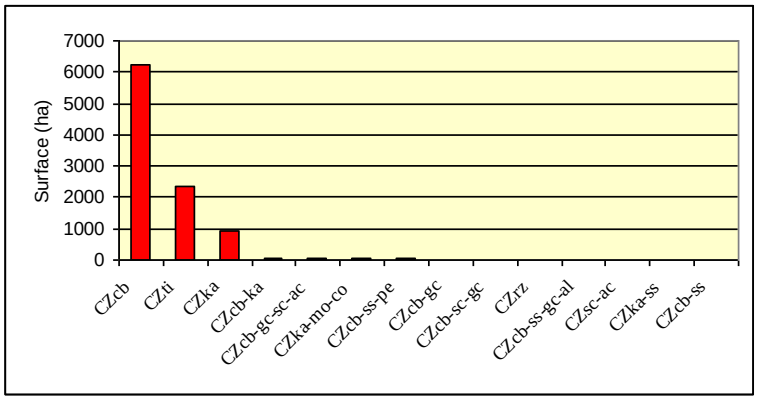

Figure 6: The characteristic subtypes of the Chernozems in the Iaşi vineyard

The soils within this class are characterized by acidity (pH = 5.2 – 6.8) and a low content of nourishing substance: the total nitrogen (0.045 – 0.27%), the mobile phosphorus (6 – 30 ppm) and the mobile potassium (80 – 188 ppm).

The Preluvosols are spread over an area of 266.96 ha and are represented by the mollic, stagnic and typical subtypes. The Luvosols, with the typical and stagnic subtypes, occupy only 27.18 ha (table 1).

3.3. The soils of the **Hidrisols class** occupy a small area within studied vineyard (352.28 ha). This soil class is represented by the Gleysols (GS), which are spread in the narrow valleys and the abandoned water courses of the pedological charted area. These soils are characterized by the strong excess of groundwater.

The subtypes of the Gleyosols are cernic (GSce), calcaric-cernic (GSce-ka), mollic-calcaric (GSka-mo). These types of soils are spread in Bahlui field.

3.4. The **Salsodisols class** owns the smallest area in the Iaşi vineyard, respectively 17.20 ha. The Solonchacks (SC) and the Solonetz (SN) are the the types which are included in this soil class.

3.5. The soils of the **Antrisols class**, represented by the Erodosols (ER) and Anthroposols (AT), were formed as a result of the strong antropogenetic influence. These soils occupy a widespread area, respectively 2040.88 ha (table 1).

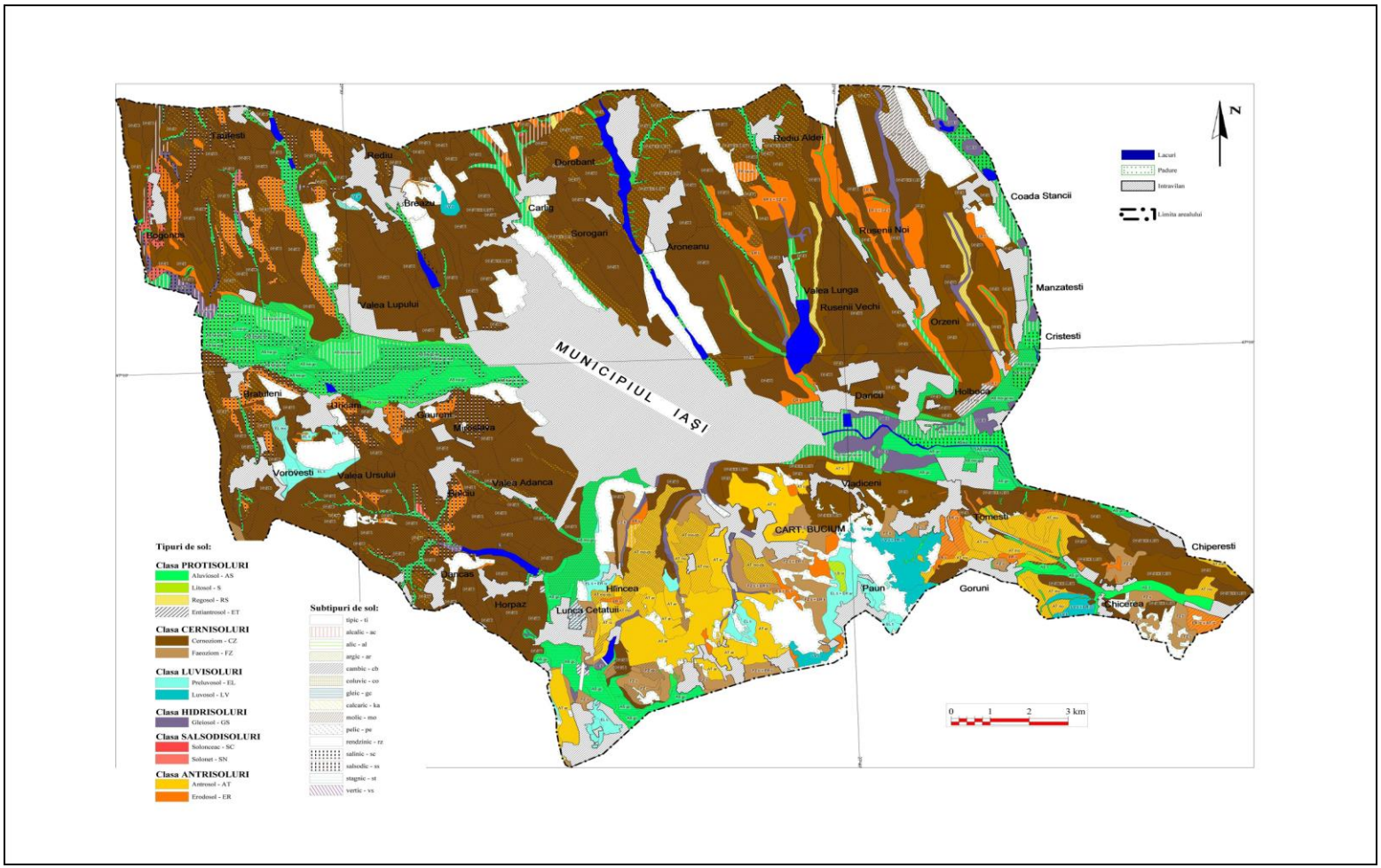

Figure 7: The Iaşi vineyard. The soilo map

Data processing after OSPA – Iaşi, 1991, 1992, 1998, 2005, 2008

The Erodosols (551.88 ha) are characterized by the very strong and excessively eroded soils, as result of the human activities, so that the remaining horizons do not allow the framing in a particular soil type. These soil types have a high content of $CaCO_3$ (13.4 – 18.8%) and a low content of total nitrogen (0.045 – 0.22%). The supply with mobile phosphorus (38-200 ppm) and mobile potassium (287 – 401 ppm) is good. The calcaric subtype is characteristic of the Erodosols (ERka) within the area undergoing this study.

In the Iaşi vineyard, the Erodosols occupy the slopes with high gradients (15-35%): Breazu Hill, Capul Rediului Hill, Bogonos Hill, the cuesta escarpments with western exposure of Chirița brook, Satului Valley, Şapte Oameni Valley.

The Anthroposols are the soils which present an anthropogenetic horizon (at least 50 cm) within the upper part. In the studied area, these soils present a weak acid to weak alkaline reaction (pH = 6.2–8.4), a content of total nitrogen between 0.045% and144% (low - middle), a mobile phosphorus content between 9 ppm and 200 ppm (very low- very high) and a mobile potassium between 78 ppm and 401 ppm.

The Anthroposols occupy 1489 ha within studied area (table 1), being represented by types as mollic-hortic (ATho-mo), calcaric-mollic-hortic (ATho-mo-ka), argic-hortic (ATho-ar), calcaric-rendzinic-hortic (ATho-rz-ka) and cambic-hortic (Atho-cb).

3.6. The **Complexes of soils** own 4,288.03 ha, occupying the areas affected by degradations (active and semiactive landslide), especially the slopes with gradients of 5 - 10%: Iaşi Coast, Păun, Repedea, Bârnova and Breazu hills. The complexes consist of Erodosols (the most complexes) and other soils affected by intense and very intense sheet erosion.

Conclusions

In the Iaşi vineyard there have been identified six soil classes: Protisols, Chernisols, Luvisols, Hidrisols, Salsodisols and Anthrisols and 13 soil types.

The soil cover of the studied vineyard is dominated by the soils of the Chernisols class, which represent 52.02% of pedological charted area. The soils of the other soil classes own the following shares of the studied area: Protisols – 12.18%, Anthrisols – 10.45%, Hidrisols – 1.80%, Luvisols – 1.51% and Salsodisols – 0.09%.

The Chernozems (9718.86 ha) own the biggest part of Chernisols class (95.65%) and also of the whole vineyard (49.76%). The cambic Chernozems (CZcb) are predominant with an area of 6218.84 ha.

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