THE PECULIARITIES OF THE SOIL COVER FROM REBRICEA BASIN

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Abstrac. Situated in the central part of the Central Moldavian Plateau, the Rebricea basin is characterized by an average gradient of 6,14^{o}, belongs to the medium class of landslip in terms of susceptibility, that is the IInd, the highest susceptibility, specific to the IVth class, being a peculiarity of the surfaces with slopes bigger than 25^{o} that occupy limited areas within the basin, no more than 0,27%. The main constraining factors for the capacity of agricultural production of the terrains in the hydrographic basin of Rebricea are the erosion in the surface, landslips, the humidity excess, the liability to inundation, the acidify factor and the small amount of nutritive elements.

Keywords: *taxonomy framing, suitability, quality*

1. General aspects

Rebricea Basin is situated in the central part of the Central Moldavian Plateau, component of the Moldavian Platform, a rigid geostructural unit, prolongation of the East-European Platform. From the left tributaries of Bârlad, between Vaslui and Stavnic Basins, Rebricea River does stand out, its basin being characterized by a 20-minute geographical display, in the North-South direction, between 46^{o}47’ and 47^{o}07’ latitude North, and by a 7-minute one in the West-East direction, from 27^{o}31’ to 27^{o}38’ longitude East (Fig 1).

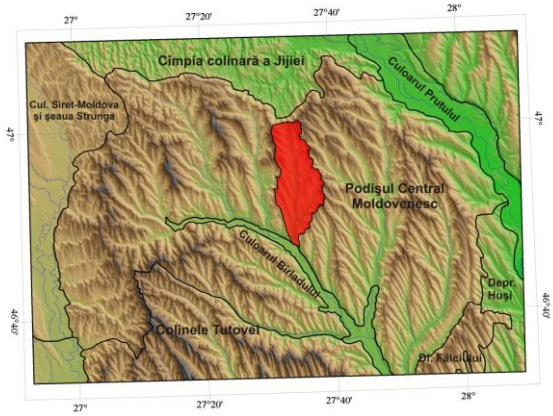

Figure 1 The position of Rebricea Basin within the Central Moldavian Plateau (limits after Ungureanu Al. (1993)

Neighbouring Nicolina Basin in the North, Vaslui Basin in the East and Stavnic Basin in the West, Rebricea Basin has a total surface of 157,7 km^{2}, being characterized by

a maximum length of 25,3 km, a maximum width of 10,15 km şi and an average value of the width of 6,23 km, accumulating 2,26% of the Bârlad Basin. Rebricea River spings out fron 325 m altitude, from the territory of the Commune Grajduri, from Dl Bordea, and flows into Bârlad River, on the territory of the Commune Vultureşti, in Vaslui County, in the South of the locality of Podeni, having a total length of 28,9 km.

The hydrographic network in the territory is formed by the flows of Rebricea River and its tributaries – the left ones (Cocoara, with Pietrăria rivulet, Rebricea Seacă, Sasova, Bolați, with Tufeşti rivulet) and the right ones (respectively Cărbunari, Grajduri, Valea Satului, Ciocârleşti, Căueşti, Pojorasca, Tatomireşti, Crăciuneşti), which are, in general, short, with steep slopes and with intermittent flowing, drying up during prolonged droughts.

Bordered by a general ensemble of relief of cuestas, Rebricea Basin is characterised by an elongated shape and a North-South general orientation, in accordance with the overall lowering of the altitude in this direction. Because of the 2nd degree asymmetry – specific to the re-consequent valley of Rebricea, the hydrographic basin has developed asymmetrically, neighbouring on the left a steep slope that corresponds to a cuesta with Western exposure, and to the left, by a square, prolonged hill side, superposed on a reverse of cuesta. The left hill side occupies 59% out of the total surface, being sectioned by the same types of valleys as the main valley, re-consistent respectively, while the secondary hill side, the square one, with a surpace of 41%, is sectioned by subsequent diagonal valleys that gave birth to some cuestas with Northern and North-Eastern exposure.

Regarding the altitude, the valley comes out as a plateau unit, characterized by an average altitude value of 217,3 m. One third of the surface of the plateau has altitudes that range between 150 and 200 m (30,29%), similar values having also the class of the values of 200-250 m, that register a percent of 28,3. After this threshold, the frequency of the altitudes lowers gradually, the last altitude class, the one with values bigger than 400 m, accumulating only 0,02% out of Rebricea Basin. (Fig 2).

The lowest altitudes are to be found in watersides, reaching 108,8 m altitude, in the Southern part of the locality of Podeni, in the commune of Vultureşti, Vaslui county. The maximum altitude in the basin (404m) is reached by Poiana Hill in Cetate/Rusului, situated in the North-North-Western part of the basin, area superposed on the gritstones and the Păun chersonian sands. At the border of the basin there are altitudes higher than 350 m, especially in the South-Eastern part, in Mirceşti Hill (386,5 m), Tufeşti Hill (375,2 m) and Răşcani Hill (391,9 m). Nonetheless, there are similar altitudes in the North-Eastern and North-Wetern parts of the basin, as well, in Şcheia Hill (393,9 m), Bourului Hill (362 m), Moviliței/Grajduri Hill (399,4 m) and, respectively, La Stejar Hill (393,4 m), Schitului Hill (343 m), Ruleni Hill (376 m).

In the North-Eastern Part, in the North-South direction, the altitudes go down, taking the form of some fingerings, bordered by the valleys of the rivers Rebricea Seacă, Valea Pietrăriei and Cocoara, along which there are strung the following villages: Bodeşti, Rediu, Sasova, Boroseşti şi Lunca Rateş. In the central-Eastern part, the highest altitude is to be found in Focşeasca Hill (326,5), that almost gets to the waterside through the hills Bodeşti-Perieni-Sasova-Gura Văii (195,2 m).

These two inter-riverine crests shelter the villages of Tufeştii de Sus, Tufeştii de Jos, Draxeni and Bolaţi. In the South-Eastern part, Mirceşti Hill (386,5 m) decreases in altitude both to the North and to the South, getting to the Southern end of the basin to 275 m, in Măcreşti Hill and to 208,3 m in Unceşti Hill. In the Western half of the territory, the highest altitudes are localized in the North-North-Western part, in Moviliţei Hill (399,4 m) and Şcheia Hill (393,9 m), these altitude values becoming lower and lower while approaching Rebricea waterside, along the right tributaries and, Glodeni Hill (270,8 m) in the South.

Rebricea Basin, characterized by an average gradient of 6,14^o, belongs to the medium class of landslip in terms of susceptibility, that is the IInd, the highest susceptibility, specific to the IVth class, being a peculiarity of the surfaces with slopes bigger than 25^o that occupy limited areas within the basin, no more than 0,27%.

In terms of the occupied surface, the first position is taken by the ground with a moderate gradient (5-15^o), that represents 48,13%. This ground is consistent with the geological structure of the area, and is to be found on the hill sides oriented towards South or South-West or on the inter-riverine surfaces from the basin. The ground with a high gradient (15-20^o) or very steep (>20^o), corresponding to the top of cuesta, occupies relatively limited areas, situated around the value of 3,09% and, respectively, 1,31% and concentrated in the Eastern and South-Eastern parts of Rebricea Basin. The highest gradient af the ground is specific to the left hill side of Rebricea and to its left tributaries, in this sense the side of Bolaţi River being remarked. Limited surfaces with such slopes are to be found also in the Western part of the basin, on the square sides of the tributaries (Cărbunari, Crăciuneşti etc.) (Fig 3).

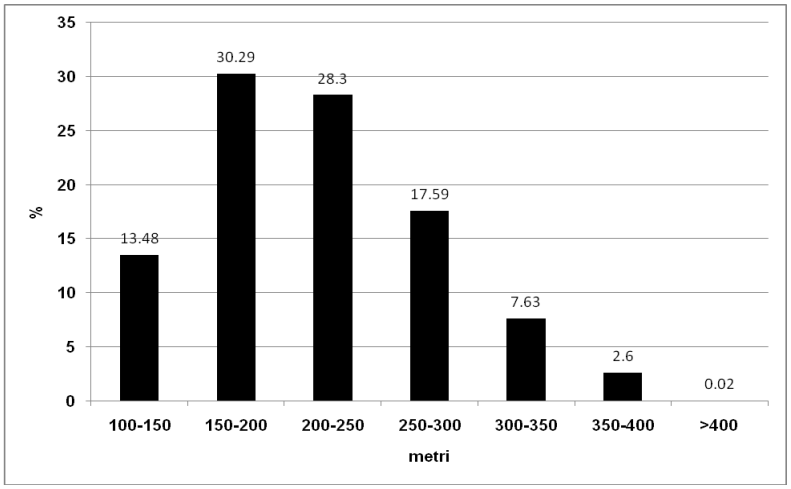

Figure 2. The distribution of altitude classes in Rebricea Basin

The areas with a low slope gradient (<5^o), generally corresponding to watersides, represent almost half of the surface of the basin (47,45%), the slopes with a 1-3^o gradient holding a significant share, approximately 20,15%.

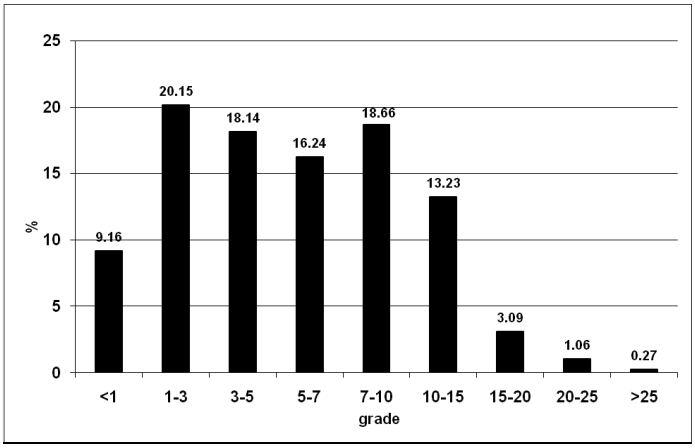

Figure 3. The distribution of the classes of slope gradients in Rebricea Basin

The ground with the gradient lower than 1^o is to be found, preponderantly, in the left half of the basin, in the inferior flow of the River Cocoara, in the middle flow of the River Rebricea Seacă or in the waterside of the Bolați River, after the confluence with Parcioaia, but, especially, in Rebricea waterside, increasing its surface considerably after the confluence with Crăciunești and Bolați, downstream of Rateşu Cuzei. In the Western half of the basin, the ground with the gradient lower than 1^o occupies very limited surfaces, mentioning here the area of confluence Grajduri-Rebricea, and also the upstream springing spot of Crăciunești River. A bit higher slope gradients ($1\text{-}3^o$) are to be found especially in the superior flow of Rebricea and on the square sides of the right tributaries, Rebricea Seacă and Bolați.

The orienatation of the hill sides in the basin is given by both the existence of a double system of stratigraphic slopes, that create optimal conditions for the development of the structural relief, represented within the basin by valleys, cuestas and structural plateaux, and, more importantly, by the flow of Rebricea River, consistent with the sloping/inclination of the strata. The main valley of Rebricea and of its left tributaries has led to the formation of some hillsides with their reverse Eastward-oriented (21,95%) or South-Eastward (12,37%) and with the top towards West (16,3%) or North-West (6,79%). These hillsides correspond to the second class asymmetry, while the cuestas with Northern exposure, sculpted by the right tributaries belong to the first class asymmetry. The slopes on the right side of the basin are characterized by steep slopes with North-Eastern exposure (11,38%) and Northern (3,63%) and with reverses that incline towards South-West (17,19%) (Fig 4).

According to the study conducted by I. Vasiliniuc şi A. Ursu in 2007, the majority of the hillsides processes within Bârlad Basin are visible on the hillsides with Northern and Western exposure (the steep slopes of cuestas). Taking into account that 23,09% of the hillsides of the basin have a North-Western or Western exposure, the interest zone is dominated by the IVth class of landslip in terms of susceptibility (very high), being followed by the medium one, with a percentage of 11,30 in the case of the hillsides with North-Eastern exposure (the IInd class) and by the third, high in the case of the hillsides with Northern exposure.

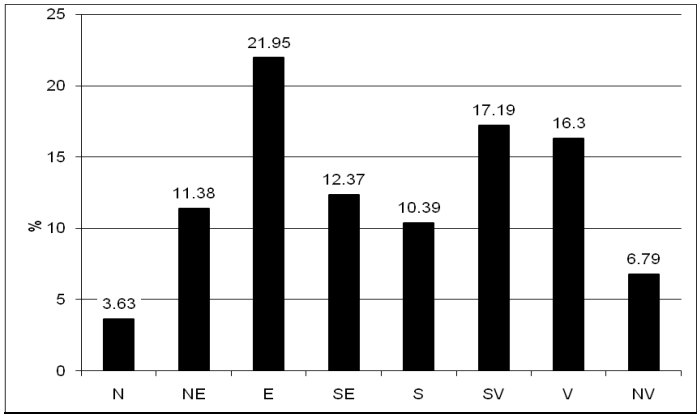

Figure 4. The distribution of the classes of exposure of the slopes/hillsides in Rebricea Basin

2. The taxonomy framing and the territorial distribution of the soils with agricultural usage

For the study of the soil cover of the region there has been used the data from the pedological studies realized at a 1:10.000-scale, for the communes Grajduri, Scânteia, Şcheia (the County of Iaşi) Rebricea, Vultureşti, Zăpodeni şi Dăneşti (the County of Vaslui), carried out by OJSPA Iaşi and OJSPA Vaslui. Using this previous information, there have been made the soil map for Rebricea Basin, in accordance with the norms imposed by SRTS (2003) (Fig 5).

After a thorough analysis, there have been identified 7 classes of soil, out of the 12 of the SRTS, and 15 types of soils. The diversity of the pedological coverage is highlighted more clearly by the 54 subtypes of soil and by the 9 complexes of soil separated in this space.

As far the *class distribution* is concerned, we notice that, related to the whole surface of the basin of 15769 hectars, including the forested areas that were not mapped by OJSPA, respectively the settlements and the acquatic surfaces, cernisoils are prevalent, with 38,13%, followed by protisoils (6,54%) and luvisoils, with 3,07 % (picture no. 6 up). In order to accomplish a more accurate analysis, we preferred to represent the share of the classes and the types of soils related to the mapped surface (11801,13 hectars), eliminating the forested ones or of any other nature, where, for the moment being, there are no data. This time the share of the cernisoils is more than clear, exceeding half of the mapped surface of the basin – 51,03% (Fig 6 down).

Luvisoils represent 8,64%, but, if we were to take into account the 15,75% of forested areas in the basin, most of them being located in the Northern part or on the higher interfluves, under pedogenetic conditions characteristic of soils with argil eluviation and horizon/level Bt, and also most of the soil complexes, the proportion of luvisoils would rise to 18,82%. Out of the other classes of soils, hydrosoils, antrisoils, salsodisoils and pelisoils are represented, in this order, by percentages between 5,28 and 0,44. Thus, the outlook of the basin is given by cernisoils (51,03%) and luvisoils (18,82%). Yet, the fragmentation of the relief, the pedo-geomorphological processes and the extended valley-areas have a role to play, and this is reflected in the impressive share of the protisoils (21,07%).

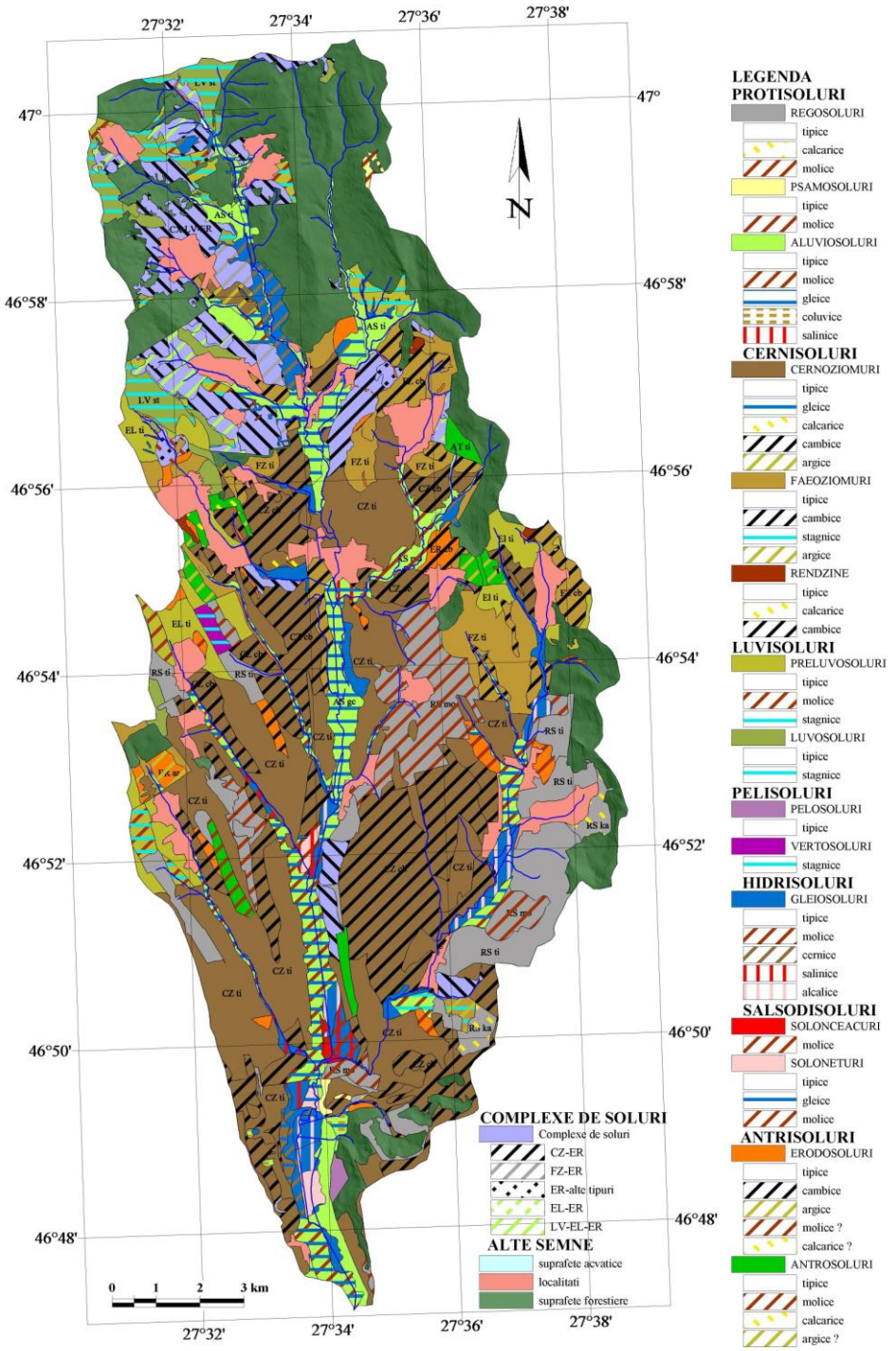

Figure 5. The soil map for Rebricea Basin (after the pedological studies OJSPA Iaşi and Vaslui, 1:10.000 scale)

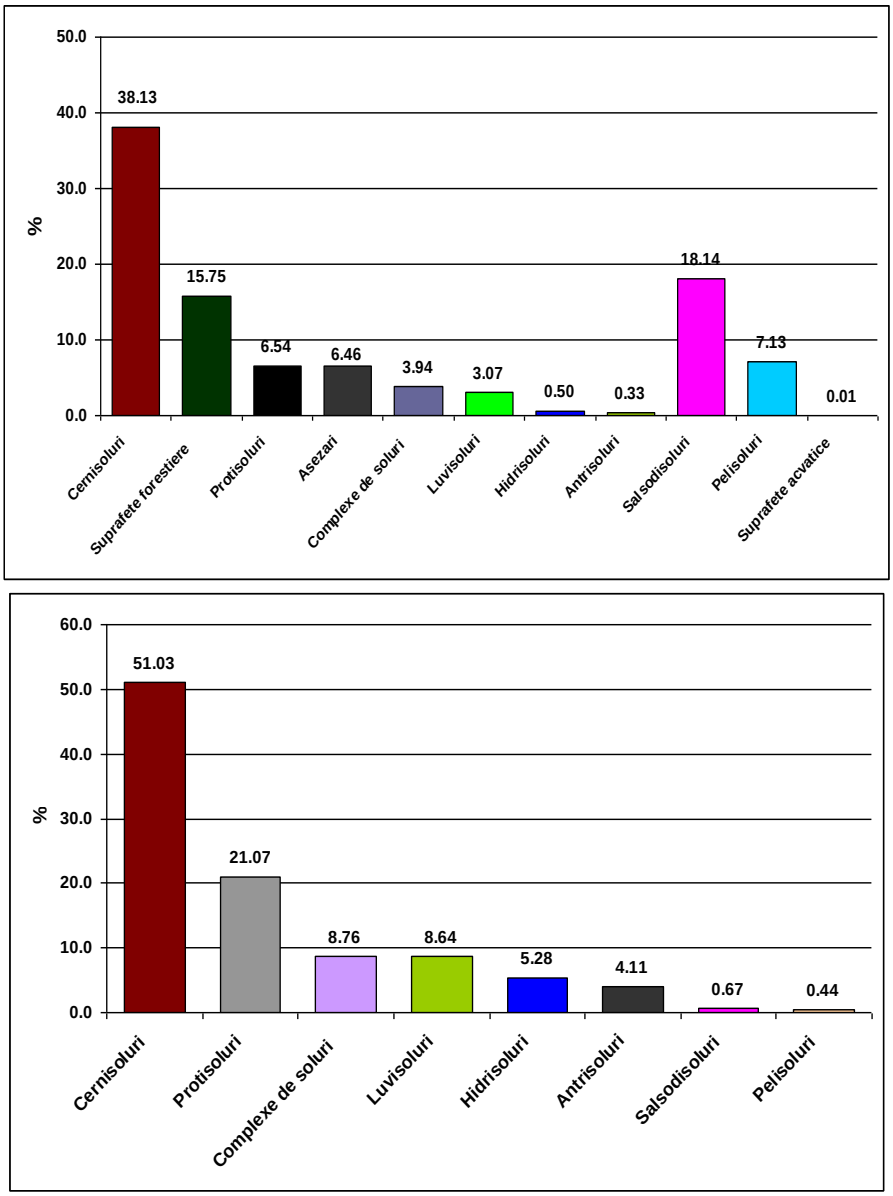

Figure 6. The proportion of the classes of the soil and of the non-agricultural usage from the total surface of Rebricea Basin (a) and from the total mapped surface (b)

As far as *the proportions of the different types of soils* is concerned, this one is consistent to a great extent with the already presented order of the classes (Fig 7).

The diversity of the soil cover can aslo be noticed by analyzing the proportion of the different sub-types that can be found in the basin (Fig 8). Apart from the typical

variants, we also find cambic sub-types of chernozems and phaeozems, mollic, especially of the gleysoils, gleyc (alluvial soils), stagnic, cernic, calcaric and so on.

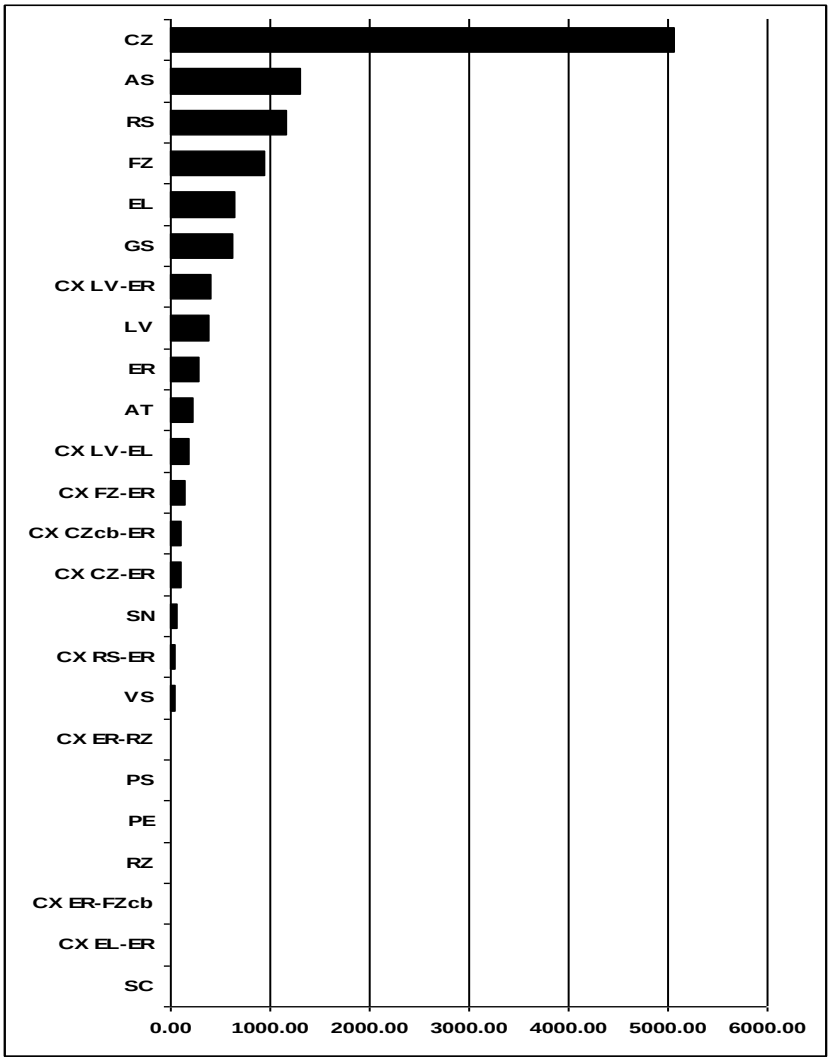

Figure 7. The proportion of the main types of soils in Rebricea Basin

Out of the 15769,86 hectars of Rebricea Basin, approximately one third, more than 5000 hectars, is represented by *chernozems* with different subtypes. Typical chernozems occupy considerable surfaces, starting with the inferior part of the basin and getting to the central part (Glodeni, Rebricea, Gura Văii Hills). In the central sector of the basin, significant surfaces are to be found on the right side of the river (Crăciuneşti, Tatomireşti Hills). In comparison with typical chernozems, cambic chernozems occupy a bit higher surfaces, being found in the areas starting with the high peaks in the inferior basin (Măcreşti, Vultureşti Hills), median (Crăciuneşti, Tatomireşti, the North-Eastern hill side of

Tatomireşti Nord, areas dispersed among Scânteia, Bodeşti and Tufeştii de Sus, Căueşti and Ciocîrleşti). Gleyc chernozems are poorly represented within the interest area of study, as they occupy a very limited surface in the Southern part of the basin, on the Western hillside of Rebricea, downstream of the confluence with Bârlad. Moreover, within the basin there have been revealed calcaric subtypes, as well, in the South of Căueşti, and argic/luvic (a significant spot in the South of Grajduri).

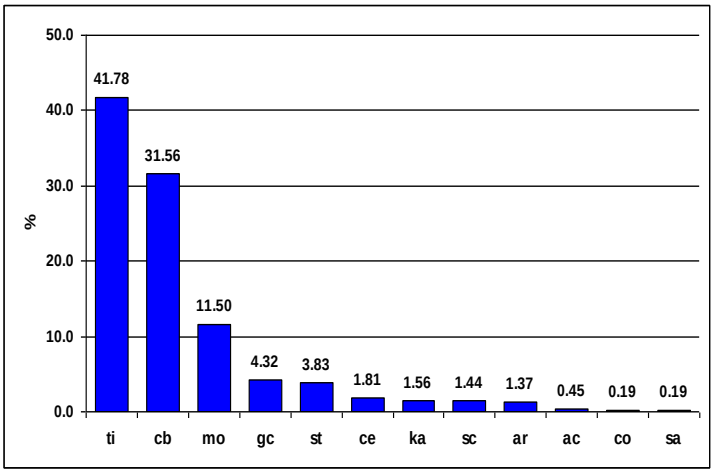

Figure 8. The proportion of the main sub-types of soils from Rebricea Basin

The significant share of the *protosoils* can be observed when analyzing the graphic below, where the second and the third positions are taken by *fluvisoils* and *regosoils*. In Rebricea Basin, the regosoils occupy considerable surfaces, in the areas of the sleep slopes of cuestas, of the superior basins of some rivers or of some torrential basins. The most compact surfaces occur around the locality of Rediu and on the Eastern border of the basin, given by Tufeşti-Cîrleşti Hill. Dispersed areas of big dimensions occur also on the right side of the river, on the slopes of Tatomireşti and Crăciuneşti Hills. Regarding the sub-type, they are typical, calcaric and mollic. As a consequence of the local conditions of the watersides, the depth of the phreatic water and the contribution of material from the hillsides, in the basin there have emerged both fluvisoils – typical, mollic, gleyc, coluvic, and various double subtypes (mollic-stagnic, mollic-gleyc, salic-gleyc, coluvic-gleyc etc.). The most significant areas are the broadenings of the valleys in the North of Scânteia, in the areas of confluence of Rebricea with Pietrăria, Rebricea Seacă on the left with the rivulets on the right, Căueşti and Valea Satului.

Faezioms, on the fourth position, are followed by *preluvosoils*, that occupy only the fifth position, having almost the same share as *gleysoils* do. In our area of study, faezioms, with their typical sub-types, cambic and stagnic-luvic, are to be found in Ruleni Hill, southwards from Valea Pietrăriei; between the villages Rateş-Lunca, on the Eastern slopes of Şcheia Plateau, around Ciocârleşti Village, on the Plateau Boroseşti-Focşeasca (where there are also cambic chernozems) and in the central sector of the basin, on the termination of the right hillside of Rebricea or on the hill-plateau Bodeşti. Preluvosoils are to be found starting with the median part of the basin, from Glodeni Hill, from

approximately 200-270 m. More significant surfaces are on the right hillside of Rebricea, in Tatomireşti Hill and on the Eastern side of Şcheia Hill. Faezioms occur more frequently on the left hillside, at similar altitudes and a more compact surface with preluvosoils occurs on Focşeasca Hill. Regarding the sub-type, there have been noticed preluvosoils typical, mollic and stagnic. The most important areas with cernic and typical gleysoils are in the waterside of Rebricea, especially towards the river mouth, where the valley is wider and the phreatic level closer to the surface; however, representative surfaces with such soils also occur in its median and superior sectors, in the areas where the valley gets broadened, and on the valleys of its main tributaries. Besides the two sub-types already mentions that hold the most important percentages, the mollic gleysoils also appear, together with salic or sodic ones in the inferior basin. An interesting aspect is the classification from SRTS, because the system qualifies these last two sub-types as being eutricambosoils gleyc-salic or gleyc-sodic. This way, the definition of the class of cambisoils mentions on the one hand,the impossibility of existence of intense gleyc properties, salic or sodic in the first 50 cm, and, on the other hand, it does not allow the separation of salic and sodic gleysoils, either.

Excepting the complexes of soils and the typical and stagnic luvosoils, predominant in the Northern part of the basin, the other types that were found in the basin are erodosoils, antrosoils, solonetz, vertosoils, psamosoils, pelisoils, rendzine and solonchaks, and they occupy reduced surfaces.

3. The suitability and the quality of the soils in Rebricea Basin

By making use of the instructions in the second volume of MESP (1987), there have been distinguished six classes of suitability, the arrangement in the already mentioned categories being made in relation with the nature and the intensity of the restrictive factors for production.

Concerning the share of each of these six classes at the level of the basin, from picture no. 9 we can infer that the soils from the second class of suitability dominate the distribution (31%), being followed by the ones in the fourth class (23%). The soils in the first class of suitability hold only 21%, but, after a comparison with other areas in Moldavia, this is a good percentage. The soils in the third class of suitability take 15%, being followed by the last two classes, the fifth and the sixth, the hold more reduced percentages (8 and respectively 2%).

The terrains that belong to the first class of quality are found in the inferior part of the basin, frequently superposed on the typical and cambic chernozems. The vastest surfaces with such terrains are on the reverse of the Rebricea cuesta, in Sasova-Perieni Hill. There are terrains from the first class also on reverses fragmented by the hydrographic network, but these ones have smaller dimensions and are located on the right side of Rebricea, in Măcreşti, Tatomireşti or Rebricea Hills.

The terrains part of *the second class* occupy higher interfluves or the superior part of the reverses of cuesta, with more significant slope gradients, yet, being confined to the median and the inferior part of the basin. Completely isolated, such surfaces are found in the superior basin, on more stable surfaces, that have not been affected by geomorphological processes, occupied by phaeozems or preluvosoils. The third class of suitability holds 15% out of the surface of the basin and characterizes some fluvisoils,

regosoils and erodosoils, affected to a less extent by erosion, and a part of the preluvosoils in the north of the basin. Within the basin, the fourth class characterizes the regosoils and the erodosoils affected more by erosion, the fluvisoils in the watersides of Rebricea and its main tributaries, as well as a significant part of preluvosoils in the North of the basin.

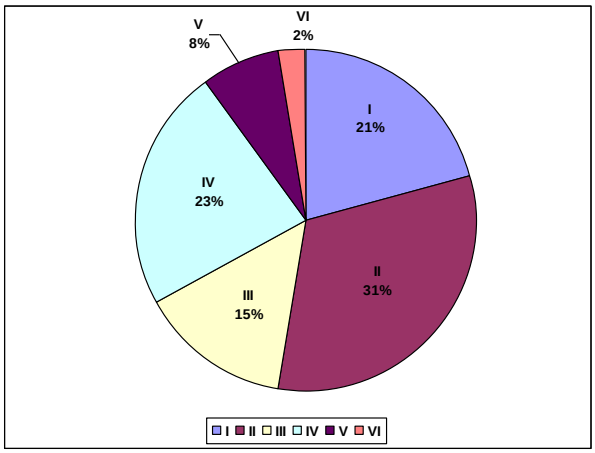

Figure 9. The distribution of classes of suitability of the soils from Rebricea Basin

The fifth class includes gleysoils, erodosoils, regosoils, fluvisoils, solonchaks and solonetz, psamosoils and pelisoils. In terms of distribution, this class is characterized especially by erodosoils and rogosoils intensely affected by erosion processes, situated in the superior part of the hillsides, but also by gleysoils or gleyic fluvisoils in the superior part of the basin. To *the sixth class* belong the extreme forms of erosion in depth, such as ravines, fluvisoils affected by salinization, alkalization and gleization, and some complexes of soils where the lack of uniformity of the terrain is representative, because of the presence of landslip or the given forms of erosion.

The terrains in Rebricea Basin have been analyzed also from the point of view of their quality; thus, there have been distinguished five classes of quality, starting from the first class, that includes soils of best quality, and getting to the fifth class, where there are included soils with major constraints for agricultural use. More than that, the classification was affected by the pedochemical properties of the terrains, the geomorphological or climatic peculiarities of the area. The determination of the classes of quality has been made in accordance with MESP methodology. The distribution of these classes of quality is rendered in figure no. 10.

Concerning the distribution within the basin of the classes of quality of the soils, this one is pretty similar to the distribution of suitability. The first, the second and the third classes are prevalent in the inferior half of the basin, less fragmented, with prolonged reverses of cuesta, hillsides with reduces slope gradients, corresponding to the area of cernisoil spreading. The terrains that belong to the fourth class of quality correspond, in a large majority, to the same types of soils, but present bigger constraints because of the steeper slopes. The fourth class is formed by the terrains with severe limitations that reduce the range of agricultural crops or that necessitate special measures or work to protect and ameliorate the soil resources. This class accumulates a percentage of 9%,

being a characteristic of the areas affected by landslips, spread mainly in the South-Eastern part of Rebricea Basin. From this perspective, in the basin the soils from the third class of quality are prevalent (37%), being followed by the second class (26%) and the first class (23%).

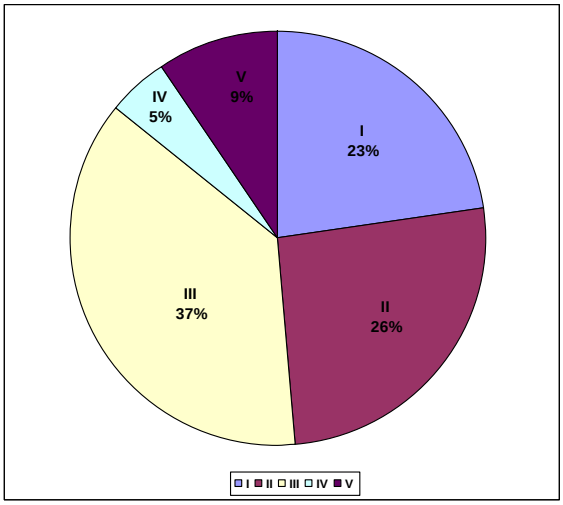

Figure 10. The distribution of the classes of quality of the soils from Rebricea Basin

The main constraining factors for the capacity of agricultural production of the terrains in the hydrographic basin of Rebricea are the erosion in the surface, landslips, the humidity excess, the liability to inundation, the acidify factor and the small amount of nutritive elements.

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