SOIL RESOURCES AND THEIR FAVORABILITY FOR VARIOUS CULTURES IN THE AREA OF COMMUNE REMETEA MARE, COUNTY. TIMIŞ

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Abstract: *The soils in the researched perimeter were formed and evolved through the interaction of the complex of pedogenetic factors, the most important of which are: relief, water, parent rock, climate, vegetation, man. Thus, in the researched perimeter, two areas with well-differentiated soils are distinguished, the result of different pedogenetic conditions. In the high plain and the hilly area on more or less carbonate reddish materials, the typical or moly preluvosols were formed and evolved. In the northern part of the researched perimeter (Ianova area) where the amount of precipitation reaches around 680 - 720 mm, on the less drained lands or slopes with northern exposure, the luvosols are formed.(* LOREDANA DARICIUC, I. GAICA, D. DICU 2016*) In the micro-depression forms due to the long stagnation of the water from the precipitations, the very accentuated stagnogleization processes generated the formation of the stagnosols. Within the researched perimeter we find vertosols on smaller areas.(* LATO, A.NEACSU, A.; CRISTA, F. ; LATO, K.; RADULOV, I.;BERBECEA, A. ; NITA, L.;CORCHES, M. 2013,*) Within the perimeter investigated in similar situations there are pellosols, soils with a pelvic horizon at the surface or at most 20 cm (below the plowed layer) that continue up to at least 100 cm, contain over 30% clay in all horizons up to at least 100 cm. In the northern part of the researched perimeter (Ianova area) where the amount of precipitation reaches around 680 - 720 mm, on the less drained lands or slopes with northern exposure, the luvosols are formed. Based on the field study, 9 types of soil were identified as follows: 1.Aluviosols: 370.10 ha, 4.26% 2.Eutricambosols: 2406.79 ha, 27.69% 3.Preluvosols: 3089.90 ha, 35.55% 4.Luvosols: 360.44 ha, 4.15% 5. Pelisoils: 1244.89 ha, 14.32% 6.Vertosoluri 454.27 ha, 5.22 7.Gleyiosols: 372.83 ha, 4.28% 8.Stagnosols: 346.42 ha, 3.98% 9.Erodosols: 47.43 ha, 0.55%. Land use The area studied has the following categories of use: -arable 7,256.08 ha -grassland 1,221.17 ha - hayfields 198.63ha - orchards 14.38 ha AGRICULTURAL TOTAL = 8,691.08 ha -forests 906.51 ha -water 203.45 ha -unproductive 39.33 ha -roads 147.05 ha -constructions 137.32 ha TOTAL = 10,124.74 ha (*NITA SIMONA, NITA L., PANAITESCU LILIANA – 2015*)*

Keywords*: soil, favorability, cultures, classes Remetea Mare*

INTRODUCTION

Agricultural land quality assessment is an in-depth knowledge of the conditions for growing, development and fruiting plants and a measurement of its suitability for certain crops (or categories of use) through a system of technical indices and grades. As such, it determines how many times a land is better than another, given its fertility as mirrored through the productions it assures.(ANIȘOARA DUMA COPCEA , CASIANA MIHUȚ, LUCIAN NIȚĂ, 2015) The amount of crop obtained per surface unit (the productivity of crops) depends on the entire assembly of environmental conditions, as well as on the influence of man that can change the natural factors or plant properties in such a way as to better capitalize under natural conditions. (NIȚĂ SIMONA, NIȚĂ LUCIAN DUMITRU ,MIHUȚ CASIANA, KOCIS ELISABETA, PANAITESCU LILIANA, LUNGU MARIUS, 2014)

Soils in the investigated perimeter have formed and evolved through the interaction of a complex of factors, of which the most important are: relief, water, parental rock, climate, vegetation, and man. (ANIȘOARA DUMA-COPCEA, NICOLETA MATEOC-SÎRB, TEODOR MATEOC-SÎRB,

CASIANA MIHUȚ, 2013 CASIANA DOINA MIHUȚ, 2018) Thus, two areas with well-differentiated soils are distinguished in the researched perimeter, resulting in different soil genesis conditions. In the high plain and the hilly area on reddish or less carbonated materials, typical or molic preluvosols have formed and evolved. Because of the mineralization of the largest part of organic residues that settle annually at the top of the soil, a reduced amount of humus is formed and, as a result, the colour of the upper horizon is brown (Ao), the horizon commonly encountered in the case of preluvosols. (NIȚĂ SIMONA, NIȚĂ LUCIAN, PANAITESCU LILIANA, 2015)

In micro-depression forms caused by the long stagnation of precipitation water, high stagnic processes have generated stagnosol formation. Soils that, even from the top of the profile, have an intensely marbled aspect (over 50% neutral colours and concretions of sesquioxide), have the W horizon grafted on both horizons A and E and at least 50 cm from the B horizon.(POPA DANIEL, ILEA RADU, BUNGESCU SORIN, DUMA-COPCEA ANIȘOARA, MIHUŢ CASIANA, BECHERESCU ALEXANDRA, 2019) In the north of the investigated perimeter (Ianova area), on the relatively stabilized sliding steps whose slope is lower than the initial, water slope circulates laterally or even stagnates a long period of year. Because of this, the soil genesis process is in a hydromorphic phase and, thus, in the soil which usually belonged to the genetic type characteristic of the slope on which there were no slides, there are gleiing processes. (DUMA COPCEA ANIȘOARA, ILEA RADU, POPA DANIEL, SÎRBU CORINA, 2018)

On the other hand, the small slope of the sliding steps prevents material movements from the original ground layer, so the profile can get a high development. Under such conditions, soils belonging to the bioclimate type with a slight clogging and eroded soils (erodosol type) appeared and evolved. In the low plain, a decisive influence on soil formation was that of the Timiş and Bega rivers. (ANIȘOARA DUMA COPCEA, NICOLETA MATEOC SÎRB, CASIANA MIHUȚ, LUCIAN NIȚĂ, TEODOR MATEOC, SIMONA NIȚĂ, CORINA SÎRBU, RAMONA ȘTEF, DANIELA SCEDEI, 2021; Casiana MIHUȚ, Anișoara DUMA-COPCEA, Aurelia MIHUȚ, 2018)By repeated change of their beds and through frequent outpourings, these rivers have deposited newly alluvial material over another already undergoing soil formation. Thus, soils in the alluvial plain appear in the form of alternative soil formation layers. After the rivers were canalled, these alluvial materials have been stopped and soil genesis processes started.(L. NIȚĂ, D. ȚĂRĂU, D. DICU, GH: ROGOBETE, GH. DAVID,2017)

On some portions, following the process of lowering the ground level, through the channel network created lately, the phenomenon of gleization occurred in a relic form. Currently, hydro-morphic soils are meet in depression forms, where waters have stagnated for longer periods. In drained portions, excess moisture is low and, thus, over a period of a year, oxygen penetrates the soil. In contact with this, reduced iron and manganese compounds from the previous excessive moisture period are oxidized and precipitate as reddish or rusty brown hydroxides. (DUMA-COPCEA ANIȘOARA CLAUDIA, MIHUȚ CASIANA, ILEA RADU NICOLAE, SÎRBU CORINA, SCEDEI DANIELA NICOLETA, POP VALER, CUȚUI MIHAELA CARMEN, 2019) Oxidation processes are, therefore, predominant, and even a salting levigation is produced, the soil profile thus evolving to the type of zonal soil. This is how typical or molic eutricambosols with different degrees of gleization occur, characterized by Ao/Am – Bv – C. On higher shapes (top of bank ridges) or in the immediate vicinity of the flooding rivers depositing coarse material, there are younger, less evolved soils, alluvial soils low or medium gleied. Within the investigated perimeter, there are, on smaller areas, vertosols.(ANIȘOARA DUMA COPCEA, NICOLETA MATEOC – SÎRB, CASIANA MIHUȚ, RADU ILEA, ȘTEF RAMONA, DANA SCEDEI, LUCIAN DUMITRU NIȚĂ, 2020) Of the characteristic soil genesis conditions, fine texture materials are represented by predominantly swelling clays. The specificity of soil genesis in this case consists in the occurrence and manifestation of vertic processes. (DANIEL DORIN DICU, PAUL PÎRSAN, JELENA MARINKOVIC,2014)

Vertic features occur in many types of soil belonging to other classes, causing separation from vertic subtypes (commonly encountered in the investigated perimeter). (SAIDA FEIER DAVID, NICOLETA MATEOC –SÎRB, TEODOR MATEOC, CRISTINA BACĂU, ANIȘOARA DUMA COPCEA, CASIANA MIHUȚ, 2020)In the perimeter investigated in similar situations, pelosols also occur, soils having a surface horizon of not more than 20 cm (under the ploughed layer) that continues up to at least 100 cm, containing over 30% clay in all horizons to at least 100 cm.(ANIȘOARA DUMA COPCEA, CASIANA MIHUȚ, SIMONA NIȚĂ, L. NIȚĂ, 2016,)

MATERIAL AND METHODS

For the calculation of soil quality grades, from the multitude of environmental conditions that characterize each unit of land (U.T. and T.E.O.) delimited in the soil study, only those considered more important, easier and accurately measurable, which are usually found in soil studies (performed by O.S.P.A. Timisoara), called soil quality indicators (KAREL IAROSLAV LAȚO, LUCIAN NIȚĂ, ALINA LAȚO, 2013)

- Indicator 3C – annual average temperature – corrected values
- Indicator 4C – annual average precipitation – corrected values
- Indicator 14 – gleization
- Indicator 15 – pseudo-gleization (stagno-gleization)
- Indicator 16 or 17 – salinisation or alkalization (soding)
- Indicator 23A – texture in Ap or the first 20 cm
- Indicator 29 – pollution
- Indicator 33 – slope
- Indicator 38 – slides
- Indicator 39 – depth of groundwater
- Indicator 40 – floodability
- Indicator 44 – total porosity in the restrictive horizon
- Indicator 61 – total $CaCO_3$ content over 0-50 cm
- Indicator 69 – base saturation degree in Ap or over 0-20 cm
- Indicator 133 – useful edaphic volume
- Indicator 144 – humus reserve in the layer 0-50 cm
- Indicator 181 – excess stagnant moisture (surface)
- Indicator 271 – land improvement management

Soil quality grades per uses and crops are obtained by multiplying 100 times the product of the coefficients (of the 17 indicators) directly participating in the grading. (D. DICU, R. BERTICI , I. GAICA ,2016)

$$Y = (x_1, x_2, x_3 ...x_{17}) \cdot 100$$

where:

Y = soil quality grade

$x_1, x_2, x_3 ...x_{17}$ = the value of the coefficients (17 indicators)

RESULTS AND DISCUTION

Scoreboard tables and fertility classes

Table 1.

Rating notes and fertility classes for wet groundwater eutric Aluviosoil

Wheat		Barley		Corn		Sunflower	
Note	Class	Note	Class	Note	Class	Note	Class
16	V	20	V	28	IV	28	IV

Table 2.

Rating notes and fertility classes for wet groundwater eutric Aluviosoil

Potato		Beet Sugar		Soy		Peas-Beans		Arable	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
28	IV	28	IV	20	V	17	V	23	IV

Table 3.

Rating notes and fertility rates for Eutric Aluviosoil

Wheat		Barley		Corn		Sunflower	
Note	Class	Note	Class	Note	Class	Note	Class
36	IV	36	IV	54	III	49	III

Table 4.

Rating notes and fertility rates for Eutric Aluviosoil

Potato		Beet Sugar		Soy		Peas-Beans		Arable	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
44	III	54	III	39	IV	44	III	45	III

Table 5.

Rating notes and fertility rates for Preluvosoil stagnant

Wheat		Barley		Corn		Sunflower	
Note	Class	Note	Class	Note	Class	Note	Class
52	III	46	III	41	III	41	III

Table 6.

Rating notes and fertility rates for Preluvosoil stagnant

Potato		Beet Sugar		Soy		Peas-Beans		Arable	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
23	IV	25	IV	41	III	46	III	39	IV

Table 7.

Rating notes and fertility classes for Aluviosoil entic, phreatic

Wheat		Barley		Corn		Sunflower	
Note	Class	Note	Class	Note	Class	Note	Class
73	II	65	II	65	II	65	II

Table 8.

Rating notes and fertility classes for Aluviosoil entic, phreatic

Potato		Beet Sugar		Soy		Peas-Beans		Arable	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
58	III	65	II	65	II	58	III	64	II

Table 9.

Rating notes and fertility classes for Aluviosoil entic, moist, loamy

Wheat		Barley		Corn		Sunflower	
Note	Class	Note	Class	Note	Class	Note	Class
81	I	72	II	80	II	72	II

Table 10

Rating notes and fertility classes for Aluviosoil entic, moist, loamy

Potato		Beet Sugar		Soy		Peas-Beans		Arable	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
58	III	72	II	72	II	72	II	72	II

Table of rating notes and fertility classes

Table 11.

Rating notes and fertility classes for wet groundwater eutric Aluviosoil

Apple		Hair		Plum		CS/CV/PC		Orchard		Pasture		Hayfields	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
81	I	81	I	100	I	84	I	86	I	90	I	80	II

Table 12.

Rating notes and fertility rates for Eutric Aluviosoil

Apple		Hair		Plum		CS/CV/PC		Orchard		Pasture		Hayfields	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
58	III	52	III	58	III	58	III	57	III	66	II	52	III

Table 13

Rating notes and fertility rates for Preluvosoil stagnant

Apple		Hair		Plum		CS/CV/PC		Orchard		Pasture		Hayfields	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
13	V	13	V	26	IV	12	V	15	V	20	V	13	V

Table 14.

Rating notes and fertility classes for Aluviosol entic, phreatic

Apple		Hair		Plum		CS/CV/PC		Orchard		Pasture		Hayfields	
Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class	Note	Class
37	IV	28	IV	42	III	38	IV	35	IV	66	II	53	III

CONCLUSIONS

The soil is a natural means of production, which is formed and evolving at the surface of the land, over time and under the influence of environmental conditions.

Also, unlike other means of production, which by use are worn out, soil, if used rationally, not only does not decrease in fertility but, on the contrary, it can increase it.

The fundamental soil propriety to ensure conditions for plant growth, and which naturally distinguishes it from the rock on which it formed, is called fertility.

The fertility of a soil depends directly on its physical and chemical properties.

Fertility is a result of the stage of soil genesis and evolution, of its composition and properties, of the physical and chemical processes that occur in the soil.

The problems of increasing soil fertility must be seen both in the light of current agricultural production requirements, of the improvement of the quality of primary production (and not only) and of the increased yields in agriculture, and of the harmonious combination with the main physical-chemical parameters of the soil with which they are in close interdependence.

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