EVALUATION OF AGRICULTURAL LANDS IN THE OUTSKIRTS OF PERIAM TOWN, TIMIȘ COUNTY

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Abstract: *The importance of the land evaluation activity consists in the fact that, through the data provided by these studies, they form the basic documentation for establishing the most appropriate practical protection measures, improving and rational use of soils for the purpose of biomass production in an optimized and rigorously correlated dynamic with the growing environmental protection requirements. The data presented in this paper was obtained from soil probes obtained from the location ground, as well as data taken from previous soil maps. In order to carry out the chemical and physical mechanical analyses, soil samples were collected from 5 profiles, respectively 3-5 soil samples in a disturbed structure and soil samples from 3 profiles, respectively 9 soil samples in 3 and 4 repetitions for the determination of hydrophysical indices. The soils encountered in the analized perimeter are of the chernozem type, with good drainage. Within this type of soil, several subtypes are separated, the predominant one being wet phreatic chernozem. Thanks to all the good properties that these soils have, their natural fertility is high, the productions obtained are superior for cereals, technical plants and fodder plants. The texture of the chernozem is loamy-sandy throughout the profile. The soil reaction (pH) is slightly alkaline with values in the Am horizon of 7.34, in the A/C horizon the value increases to 7.65, and at the base of the profile, in the Cca horizon, the value reaches 8.04. The humus content is medium with values between 2.07 and 1.02%. The content of phosphorus (P) is low and the content of potassium (K) is medium to low. Typical gleiosoil is also present. The texture is undifferentiated on the profile, being medium clay with the values of fine sand content between 25.7 and 29.2%, dust between 26.2 and 32.6%, and clay between 37.4 and 41.4 %. The soil reaction is acidic in the upper horizons and weakly acidic in the lower horizons. The humus content is relatively high in the upper horizons with a content of 2.97-2.42% decreasing in the lower horizons to 1.67-1.31%. The soil is poorly supplied with mobile P and K; shows weak microbiological activity. Cernic Gleiosol is also present in the area of the locality. The soil reaction is weakly alkaline on the entire profile with values between 8.0 and 8.15. The humus content is relatively high in the Am horizon 3.78 but decreases in the A/CGo3 horizon to 3.32%.*

Keywords: *soil, fertility, soil evaluation, crops*

INTRODUCTION

In today's agronomic vision, it can be stated that agriculture cannot exist without soil nor without a plant, in the absence of which there can be no talk of plant production, whose size it is determined by soil and climatic conditions. The atmosphere, the earth and the plant activate together in different places around the globe forming "a complete system", that is what we call ecosystem. (Blaga, 1996). The soil together with the nearby atmospheric layer represent the living environment of plants, the place in where their vital processes take place, the accumulation and transformations of substances and energy.

The soil provide's plants the water and nutrients necessary for the process of photosynthesis, process that is the basis of obtaining crops. Regardless of the level of development of the society, the soil was and remains the main means of agricultural production. (Borza, 1997).

The main source of nutrients that plants need is found in the soil, being released from organic matter with the help of microorganisms. Nutrient elements found in the soil reflect its chemical properties. At the same time, the physical properties of the soil are just as important for the growth and development of plants. (Lixandru, 1990).

The assessment of the quality of agricultural land in our country is done by following an official methodology (Lease Law no. 16/1994) which takes into account credit rating works existing in the ICPA or OJSPA archives.

According to this methodology, the production potential of the land is classified, depending on the soil, relief, climate, groundwater, in 5 quality classes.

- Class I (81-100 points) – very fertile lands, deep, medium-textured soils, permeable, unaffected by degradation phenomena (salting, erosion, landslides, excess humidity, etc.), located on flat or very slightly inclined surfaces, in climatic conditions of temperature and rainfall favorable for crops.
- Class II (61-80 points) - lands with good fertility, deep, medium-textured soils or medium-fine, with good permeability or medium-small slightly affected by degradation phenomena (salting, erosion, excess moisture, etc.), located on flat or slightly inclined surfaces, in climate conditions of temperature and precipitation favorable for crops.
- Class III (41-60 points) - lands with medium fertility, medium-coarse or fine texture, moderately affected by phenomena of degradation (salting, acidification, erosion, excess moisture, etc.), located on flat surfaces or moderately inclined, in moderately favorable climatic conditions of temperature and precipitation for cultures.
- Class IV (21-40 points) - lands with poor fertility, frequently skeletal or with hard rock, at shallow depth, with varied texture (coarse to fine), strongly affected by phenomena of degradation (salination, acidification, erosion, active landslides, excess humidity, etc.), conditions climatic conditions not favorable for agricultural crops.
- Class V (1-20 points) - lands with very poor fertility, unsuitable for arable use, very strongly affected by degradation phenomena (erosion, excess moisture, etc.) (Tudor, 1987, Ţărău, 2003).

The territory of the town of Periam is part of the Low Plain of Torontal, a component part of the Western Plain. From a geographical point of view, the territory falls within the area characteristic of the lithogenesis evolution of the Pannonian Plain, formed by the silting of the Pannonian Lake, at the end of the Tertiary and the beginning of the Quaternary. (Lotreanu, 1985).

From a climate point of view, the area studied in this paper has a temperate continental climate with mediterranean influences. The average amount of precipitation is lower than in the other surrounding areas, with 550 mm annually. It can be said that this climate, from an agricultural point of view, is especially favorable for the cultures that demand high temperatures. (Ghibedea, 1970)

The main purpose of this paper is the evaluation of agricultural lands in Periam commune, county Timiş for different agricultural crops.

MATERIAL AN METHODS

The data presented in this paper was obtained from soil probes obtained from the location ground, as well as data taken from previous soil maps. In order to carry out the chemical

and physical mechanical analyses, soil samples were collected from 5 profiles, respectively 3-5 soil samples in a disturbed structure and soil samples from 3 profiles, respectively 9 soil samples in 3 and 4 repetitions for the determination of hydrophysical indices.

The samples were processed and the following analyzes were performed:

- determination of soil reaction (PH);
- determination of hydrolytic acidity (Ah);
- determination of cationic exchange capacity;
- determination of soluble salts;
- humus determination;
- determination of carbonates;
- determination of total nitrogen;
- determination of mobile phosphorus and potassium;
- determining the granulometric composition;
- determination of apparent density;
- determination of soil density.

RESULTS AND DISCUSSIONS

The soils encountered in the analyzed perimeter are of the chernozem type, with good drainage. Within this type of soil, several subtypes are separated, the predominant one being wet phreatic chernozem. Thanks to all the good properties that these soils have, their natural fertility is high, the productions obtained are superior, for cereals, technical plants and fodder plants. In depression areas, where the groundwater level is higher and the waters are rich in potassium, gleysols formes.

Cernoziom is the main type of soil found in the studied area.

Table 1.

The physical properties of chernozem

Horizon	**Am**	**AC**	**Cca**
Depth (cm)	0-33	33-41	41-100
Coarse sand (2.0-0.2mm%)	4,4	4,2	4,0
Fine sand (0,2-0,02 mm%)	60,3	65,6	65,0
Dust (0,02-0,002 mm%)	14,4	13,9	14,5
Clay (under 0,002 mm%)	20,9	16,3	16,5
Texture	**LN**	**SM**	**SM**

The coarse sand has values of 4.4% in the Am horizon, 4.2% in the A/C horizon, and 4.0% in the Cca horizon. Fine sand, varies between 60.3 in the Am horizon, 65.6 in the A/C horizon and at 65.0% Cca. Dust, is 14.4 in Am. The texture of the chernozem is loamy-sandy throughout the profile.

Bathygleic chernoziom is one the subtypes of chernoziom soil which we met in the studied area.

Table 2.

The physical properties of typical bathygleic chernozem

Horizon	**Aț**	**Amk1**	**Amk2**	**A/Ccaac**	**Ccaac1g**	**C/Go3**	**C/Go4**
Depth	0-5	5-18	18-50	50-75	75-140	140-165	165-200
Coarse sand (2.0-0.2mm%)	0,3	0,4	0,3	0,2	0,3	0,3	0,5
Fine sand (0,2-0,02 mm%)	46,7	48,0	45,8	45,3	43,6	48,6	39,3
Dust (0,02-0,002 mm%)	22,7	22,9	23,8	23,5	25,7	26,2	23,2
Clay (under 0,002 mm%)	30,3	28,7	20,1	21,0	30,4	24,9	32,0
Physical clay	40,4	38,1	40,5	40,7	41,3	37,7	46,5
Texture	LL	LL	LL	LL	LL	LL	LL
Specific density (Dg/cm³)	2,53	2,55	2,53				
Apparent density (DA g/cm³)	1,1	1,35	1,24	1,14			

Clay, oscillates between 24.9% in the C/Go3 horizon and 32.0% in the Cgo4 horizon.
According to the granulometric composition, the soil falls into the textural class "medium textures", medium clay subclass.

Table 3.

Chemical properties of typical bathygleic chernozem

Horizon	**Aț**	**Amk1**	**Amk2**	**A/Ccaac**	**Ccaac1g**	**C/Go3**	**C/Go4**
Depth (cm)	0-5	5-18	18-50	50-75	75-140	140-165	165-200
pH	7,92	8,01	8,32	8,46	8,62	8,59	8,51
Carbonates	3,15	3,31	5,55	17,4	22,4	21,7	20,4
Humus	3,82	3,53	2,92				
P mobil (ppm)	71	72					
K mobil (ppm)	66	62					

The soil reaction is slightly to moderately alkaline with values between 7.92 in the At horizon and 8.62 in the Ccaac1g2 horizon.

Up to a depth of 50 cm, the soil is weak and moderately carbonated with values between 3.15% and 5.55% CaCO3, after this depth becoming strongly carbonated with values between 17.4% and 22.4% CaCO3.

The humus content is between 2.92% in the Amk2 horizon and 3.82% in the Aţk horizon, the soil being medium supplied with humus.
The soil is well supplied with mobile P and poorly supplied with mobile K.

The medium texture and glomerular structure ensure good aeration and good permeability for water and air, a good capacity to retain useful water and a lower resistance to soil work, which gives it the highest agro-productive potential. However, being located in an area with low precipitation and unevenly distributed, they require, first of all, arrangements for irrigation. To maintain and restore the fertility of this soil, organic fertilization is necessary.
Gleysoil is the second predominant type of soil found in the studied area.

Table 4.

Physical properties of typical gleysoil

Horizon	**Ap**	**Ao**	**ABGo**	**BtGo**	**Gr**
Depth	0-12	12-26	26-41	41-62	62-120
Coarse sand (2.0-0.2mm%)	4,3	3,1	2,5	2,5	3,8
Fine sand (0,2-0,02 mm%)	26,9	25,7	27,5	25,6	29,2
Dust (0,02-0,002 mm%)	29,5	29,8	32,6	32,0	26,2
Clay (under 0,002 mm%)	39,3	41,4	37,4	39,9	40,8
Physical clay	56,3	58,7	57,8	59,5	54,5
Texture	TT	TT	TT	TT	TT
Density (Dg/cm³)		2,50	2,51	2,54	
Total porosity (PT%)		-6,52	-8,83	-6,92	

The texture is undifferentiated on the profile, being medium clay-clay with fine sand content values located between 25.7 and 29.2%, of dust between 26.2 and 32.6%, and of clay between 37.4 and 41.4%. The total porosity has low values between 43.42 and 49.60 %.

Table 5.

Chemical properties of typical gleysoil

Horizon	**Ap**	**Ao**	**ABGo**	**BtGo**	**Gr**
Depth (cm)	0-12	12-26	26-41	41-62	62-120
pH	5,45	5,55	6,05	6,15	7
Humus	2,97	2,42	1,67	1,31	
Nitrogen index	2,3	1,9			
N total (%)	0,147	0,120	0,080		
P mobil (ppm)	8	7	4		
K mobil (ppm)	104	10	84		

The soil reaction is acidic in the upper horizons and weakly acidic in the lower horizons. The humus content is relatively high in the upper horizons with a content of 2.97-2.42% decreasing in the lower horizons to 1.67-1.31 %. The soil is poorly supplied with mobile P and K; shows weak microbiological activity. Cernic Gleysoil is one the subtypes of Gleosoil soil which we met in the studied area.

Table 6.

The physical properties of cernic gleysol

Horizon	**Ap**	**Ao**	**ABGo**	**BtGo**	**Gr**
Depth	0-25	25-40	40-60	60-80	80-150
Coarse sand (2.0-0.2mm%)	0,2	0,5	0,5	0,5	0,5
Fine sand (0,2-0,02 mm%)	36,7	36	34,6	32,7	44,7
Dust (0,02-0,002 mm%)	26	36,5	40,1	28,3	32,2
Clay (under 0,002 mm%)	36,7	36,5	40,1	28,3	32,2
Physical clay	52,9	51,6	53	50,9	45,4
Texture	TT	TT	TT	TT	LL
Density (Dg/cm³)		1,39	1,49	1,53	
Total porosity (PT%)		49	45	43	

The coarse sand shows small variations from one horizon to another, with small values between 0.2-0.5%. The fine sand is much better represented quantitatively presents values that oscillate from 32.7% in CGo4 and 44.7% in CGr5. The dust shows percentage variations on the whole profile between 22.6% and 28.6%. The clayey fraction has the same fluctuating values but with a decreasing tendency towards depth, from 36.7-40.1% in the upper horizons to 28.3% in the CGo4 horizon. By the percentage variety of the three granulometric categories and of the higher or lower weight of some minerals, this soil falls into textural class fine textures subclass medium clay loam up to a depth of 60 cm, after which texture becomes medium, medium clay subclass.

The apparent density oscillates between 1.39 g/cm3 in the Am horizon and 1.53 g/cm3 in the CGo4 horizon. The total porosity shows low values between 43% in the CGo4 horizon and 49% in the Am horizon.

Table 7.

The chemical properties of cernic gleysoil

Horizon	Ap	AmGo4	A/CGr5	CGr5	CGr5
Depth (cm)	0-25	25-40	40-60	60-80	80-150
pH	8,05	8,05	8,10	8	8,15
Humus	3,35	3,78	3,32		
P mobil (ppm)	30,5	24,8	4,8		
K mobil (ppm)	249	266	178		

The soil reaction is weakly alkaline on the entire profile with values between 8.0 and 8.15. The humus content is relatively high in the Am 3.78 horizon but decreases in the A/CGo3 horizon to 3.32%. These values of the humus content include the soil in the moderately humic soil category. The large intakes of vegetable residues and their biodegradation and mineralization conditions favors increased accumulations of humus in the upper horizons and a very large reserve of humus in range 0-50 cm.

CONCLUSIONS

The soils found within the studied perimeter are those of the chernozem type, with good drainage. Within this type of soil, several subtypes can be separated, among which wet phreatic chernozems predominate. Due to its good physical, chemical and biological properties that they have, chernozioms show a high natural fertility.

Gleisoils, due to the periodic oscillations of the phreatic water that negatively influence the physico-chemical indices and fertility, the cultivated plants hardly bear the alternation of excess and lack of moisture.

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