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PHYSICAL QUALITY INDICES OF THE GRAY TYPICAL SOILS IN ARABLE REGIME

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Abstract

The pedogenesis of the typical gray soils located in the central Cordru forest, is determined by the elementary processes conditioned by the pedogenetical ambiance typical for the central forests. Their framing in the ecological agricultular cycle, implies the pedogenetical ambiance modification and respectively, changes the direction and intensity of several elementary processe. In arable regime, in the typical gray soils occurs the intercalation of the structural-functional-antropical stratification with the structural-functional primary differentiation, as a result of the initial pedogenesis type.

INTRODUCTION

The gray soils are pedogenetical formations with the genesis determined by the pedogenetical elementary processes conditioned by the pedogenetical ambiance typical for the central Codru Forests. Their framing in the ecological agricultural cycle, implies the pedogenetical ambiance modification and respectively, changes the direction and intensity of several elementary processes. As also, their framing within the agricultural circuit implies the substitution of the vegelal forest formations with the vegetal herby formations. In such substitution, occurs changes firstly in the soil hydrotermal regime. Increases the water amount as a result of consumption reduction on transpiration, increases the temperature as a result of shade degree reduction as well as aeolian factors intensification which lead to the evaporation increasing. The mentioned implications have direct impact on soil biota and respectively on the soil biological regime. On the other hand, the plowing works leads to the airhydrical regime modification, ie to the intensification of oxidation processes (mineralization).

As a result of framing the gray soils in the agricultural regime reacts firstly the content and humus composition. In literature we can also find information concerning the modification of soil solution reaction, degree of base saturation, nutrients provision etc. In the same time, practically there is no information concerning the soil physical traits evolution and physical quality indices evolution of the gray soils in agricultural regime, specialy in arable regime. The purpose of this paper is evaluation of the physical quality indices of the gray soils under arable regime.

MATERIAL AND METHODS

Research was conducted in an agricultural land belonging to the agricultural enterprise Ivancea, from Orhei district. Within specified land, were placed four profiles depending on the relief. The soil processing and crop multiannual structure is the same for the entire land.

Apparent density (ρb) were determined using the Kacinski compactimeter; solid phase density (ρs) - using accelerated Petinov method. Total porosity were calculated through relation Et = (1- ρb/ρs) x 100 when aeration porosity using relation Ea = Et – W [2]. Through the method the cone of Vasiliev was determined the plasticity, and using the relation I = Le – Li were calculated the plasticity index. The linear expansion coefficient were determined using the relation COLE =[(ρt - ρb)]/ρt x 100 [1].

RESULTS AND DISCUSSION

In the table below we notice that on the entire pedogenetic active segment the investigated soils are characterized with optimal ρ_b values. Even where the values exceed 1.3 g/cm^3, they does not exceed the critical threshold (1.45 g/cm^3).

The ρs values highlights homogeneous profiles, these increasing with the depth from 2.58 g/cm^3 (in the surface layer) till 2.70 g/cm^3 (in the inferior segment) of the pedogenetic active layer. Some signs of textural differentiation of the profile is not found, in the same time ρb highlights an slight but noticeable compaction in the 30-50 cm layer, here being the highest values of this parameter. This allows us to conclude that in the gray soils in arable regime occurs the structural\functional differentiation, ie within the agrophysical profile it distinguish arable and under arable layers [3]. This stratification is also proved by the total porosity values and aeration porosity values. In the compacted layer it noticed the lowest values of these parameters.

To note, profile distribution of ρb values and porosity indices, highlights some differential textural traits of the profile conditioned, probably, by the soft clay character of distribution on the profile.

CONCLUSIONS

1. In an arable regime, in the typical gray soils occurs the intercalation of the structural-functional-antropical stratification with the structural-functional primary differentiation, as a result of the initial pedogenesis type.

Table 1

Agrophysical indices of the gray soils

Depth, cm	ρ_{b}, g/cm³	ρ_{t}, g/cm³	ρ_{s}, g/cm³	COLE, %	Porosity		Plasticity		
					E_t	E_a	Super. limit	Infer limit	Plasticity index
Profile 1									
0 – 10	1.16	1.30	2.58	12.10	55	42.9	27.1	22.4	4.7
10 – 20	1.14	1.30	2.58	14.63	56	42.1	25.5	21.1	4.4
20 – 30	1.18	1.34	2.63	13.64	55	41.2	37.8	25.2	12.6
30 – 40	1.26	1.44	2.63	14.36	52	37.3	23.6	21.0	2.6
40 – 50	1.32	1.54	2.65	16.58	50	33.0	29.6	26.3	3.3
50 – 60	1.28	1.47	2.68	14.50	52	37.4	25.0	24.0	1.0
60 – 70	1.29	1.48	2.70	14.94	52	37.4	31.5	25.8	5.7
Profile 2									
0 – 10	1.00	1.06	2.58	8.98	61	51.8	28.5	24.0	4.5
10 – 20	1.04	1.14	2.58	10.19	59	46.9	28.4	25.0	3.4
20 – 30	1.02	1.72	2.63	11.2	61	48.5	26.7	22.9	3.8
30 – 40	1.22	1.39	2.63	14.19	53	38.8	27.1	23.9	3.2
40 – 50	1.24	1.44	2.65	16.13	53	37.8	24.7	24.6	0.1
50 – 60	1.30	1.50	2.68	15.34	51	35.1	24.9	24.5	0.4
60 – 70	1.32	1.52	2.70	15.05	51	35.4	32.5	27.5	5.0
Profile 3									
0 – 10	1.04	1.09	2.58	5.03	59	50.1	26.7	23.9	2.8
10 – 20	1.14	1.14	2.58	-	56	44.1	24.0	18.0	6.0
20 – 30	1.14	1. 33	2.63	17.62	56	43.4	20.7	19.7	1.0
30 – 40	1.40	1.60	2.63	14.27	47	32.4	20.9	19.5	1.4
40 – 50	1.32	1.54	2.65	16.58	50	33.0	22.2	21.0	1.2
50 – 60	1.35	1.58	2.68	17.21	49	31.5	28.9	24.7	4.2
60 – 70	1. 30	1.54	2.70	18.37	52	34.1	27.7	26.4	1.3
Profile 4									
0 – 10	1.03	1.13	2.58	9.62	60	48.8	28.3	27.1	1.2
10 – 20	1.39	1.60	2.58	15.31	46	31.1	26.0	23.1	2.9
20 – 30	1.25	1.46	2.63	17.01	52	35.1	25.0	22.9	2.1
30 – 40	1. 32	1.57	2.63	19.10	50	31.3	28.9	25.1	3.8
40 – 50	1.14	1.39	2.65	22.25	57	34.2	25.7	24.7	1.0
50 – 60	1.27	1.54	2.68	21.45	52	30.5	32.2	29.2	3.0
60 – 70	1.26	1.52	2.70	20.63	53	32.2	30.1	24.8	5.3

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