PEDOGEOCHEMISTRY OF HORTIC ANTHROSOL FROM COPOU GREENHOUSE – IASI (I)

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Abstract

The soil from Copou greenhouse – Iasi is a mixic-proxicalcaric-hipohortic entianthrosol (profile IS.1), associated with proxicalcaric–hortic-anthrosol (profile IS.2). Characteristic for this anthrosol is the formation at depth of 12–48 cm of Ahok horizons, proto-frangipanes or frangipanes, which determined the differential evolution of pedogeochemical processes in soil profiles (geochemical segregation phenomena). The studied soils fall within the class of medium and fine textured, the dominant particles size fractions (with very close weight) being sand and clay. The migration and accumulation tendency of fine particles size fractions at Ahok(x)2 horizon level represent one of the conditions for frangipane horizons formation and developing of geochemical segregation phenomena. For upper horizons of profiles are characteristics neutral conditions – weak alkaline and moderately oxidizing, and for bottom horizons are characteristic neutral conditions – weak acid and moderately reducing. Following the total soluble salts content (variation limits: 152.92–688.02, average: 382.87 mg / 100 g soil), the upper horizons are highly salinized (Apk1) and moderately salinized (Apk2, Ahok(x)1 and Ahok(x)2), and the bottom horizons are weak salinized. The total phosphorus content varied between 94.57–768.05 µg P_2O_5/g soil, with an average of span by 53.95 % from total phosphorus. The inorganic phosphorus represents 46.03 % from total phosphorus, and the organic phosphorus is 53.95 % from total phosphorus. The phosphorus extractable in acetate – lactate, non-occluded phosphorus, varied between 90.09–740.09 µg P_2O_5/g soil, with an average of span by 366.50 µg P_2O_5/g soil (which represents 94.73 % from total phosphorus).

Key words: hortic anthrosols from protected area, pedogeochemistry, pedogeochemical segregation

The spread of soils in protected area is low, in solar and greenhouses, usually located near of big cities, being commonly cultivated with vegetables (Munteanu N. et al., 2010). Neither, European or national level does not exactly known the areas occupied by soils from protected areas. This is due, on the hand the fact that these soils have a relatively short operating time (compared with normal agricultural soils), and secondly that the cultivation technologies of these soils are periodically changed, at relatively short intervals. In consequence, the pedo-geochemical characteristics of the soils from protected area varied continuous, making it difficult to stick them in a certain class of soils.

The soils from protected area (greenhouses and solariums) are frequently represented by entianthrosols and anthrosols, both characterized by relative large pedogeochemical variability, at subtypes and varieties level (Florea N., Munteanu I., 2003; Filipov F., 2005; Blaga Gh. et al., 2008). The frequency and regional distribution of soils from protected areas may not be related to lithology, formation factors of soils and pedogenetic processes, characteristic of certain physical-geographical areas. In addition, the arrangement technologies of protected areas and the exploitation methods require, both the modification of pedogeochemical characteristics of initial soils (over which are set the greenhouses and solariums), often to the almost complete blurring of their characteristics, and the continuous changes of pedogeochemical properties during of these soils exploitation (Mănescu B., 1984; Davidescu D., Davidescu V., 1992; Voican V., Lăcătuş V., 1998).

The anthrosol from Copou greenhouse – Iasi has been extensively studied, in this moment being one of the most well known antrosol from Romania. Existing papers, by undoubted quality addresses issues, treat different particular aspects (agricultural, pedological and agrochemical, etc.)

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of this anthrosol (Filipov F. et al., 2001; 2004; Călin M. et al., 2003; Filipov F., 2005; Bulgariu D. et al., 2008; 2009; 2010). Our studies provide new data related to the pedogenesis and pedogeochemistry of anthrosol from Copou greenhouse – Iasi, aspects that were insufficient clarified by the previous studies. In this first part are discussed problems related to the morphology, texture and physical-chemical characteristics of anthrosol from Copou greenhouse – Iasi. In the second and third parts of this study will be discussed mineralogy and pedogeochemistry aspects of this anthrosol.

MATERIAL AND METHOD

For experiments have been used soil samples from two representative profiles from Copou greenhouse – Iasi (*fig 1, tab. 1*). The two profiles were carried out across the middle span No. 16, at distance of 50 cm (IS.1 profile) and 1.0 m (IS.2 profile) against heating register. The soil samples were drawing according with usual methodology (Borlan Z., Răuță C., 1981; Bulgariu D., Rusu C., 2005) from each horizon, at the end of plants vegetation period.

Particle size analysis was performed by standard methodology by screening for particle size fractions > 0.02 mm, and pipetting for grain size fraction < 0.02 mm (Borlan Z., Răuță C., 1981; Pansu M., Gautheyrou J., 2006)

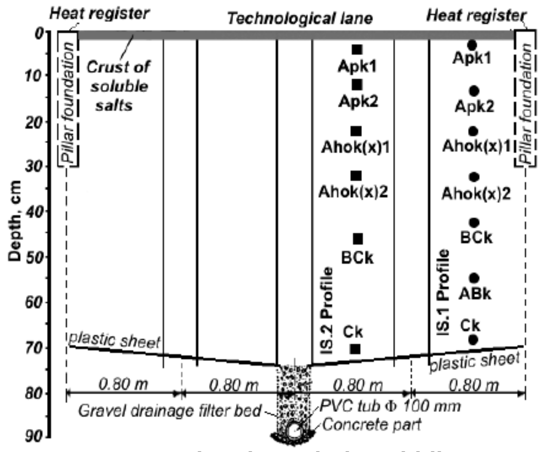

Figure 1 **Cross section through the middle span No. 16 from Copou greenhouse – Iasi.** On figure are mark the relative position of soil profiles and sampling points. .

Table 1

General characteristics of studied soil samples

Horizon#	ΔH; cm	$\overline{H}$; cm	Depth; cm	Vegetal materials,%*	Parental materials, %*(1)	Fine fraction, %(2)	ρ; g / cm^3	Texture#
IS.1 PROFILE								
Apk1	0 - 6	3,5	6	0,38	3,68	95,94	2,6251	Medium loamy (LL)
Apk2	6 - 14	10,0	8	0,61	2,91	96,48	2,5738	LL-TT transition
Ahok(x)1	14 - 25	19,5	11	0,53	2,05	97,42	2,6107	Medium loamy clay (TT)
Ahok(x)2	25 - 48	36,5	23	0,33	1,48	98,19	2,5669	Medium loamy clay (TT)
BCk	48 - 56	40,5	8	0,11	3,19	96,70	2,6435	Medium loamy clay (TT)
ABk	56 - 62	59,0	6	0,05	4,26	95,69	2,6288	Medium loamy clay (TT)
Ck	62 - 75	68,5	13	0,00	3,88	96,12	2,6733	Sandy clay (TN)
Average on profile			*10,71*	*0,28*	*3,06*	*96,64*	*2,6174*	*Medium - Fine*
Average on upper horizons			*8,33*	*0,50*	*2,88*	*96,61*	*2,6032*	*LL-TT*
Average on bottom horizons			*9,00*	*0,05*	*3,77*	*96,17*	*2,6485*	*TT-TN*
IS.2 PROFILE								
Apk1	0 - 5	2,5	5	0,43	3,41	96,16	2,6407	Medium loamy (LL)
Apk2	5 - 12	8,5	7	0,38	3,09	96,53	2,5573	LL-TT transition
Ahok(x)1	12 - 21	16,5	9	0,45	2,17	97,38	2,6197	Medium loamy clay (TT)
Ahok(x)2	21 - 40	30,5	19	0,27	1,75	97,98	2,5584	Medium loamy clay (TT)
BCk	40 - 60	50	20	0,08	4,07	95,85	2,6915	Medium loamy clay (TT)
Ck	60 - 75	67,5	15	0,13	3,65	96,22	2,6085	Sandy clay (TN)
Average on profile			*12,50*	*0,29*	*3,02*	*96,68*	*2,6126*	*Medium - Fine*
Average on upper horizons			*7,00*	*0,42*	*2,89*	*96,69*	*2,6059*	*LL-TT*
Average on bottom horizons			*17,50*	*0,10*	*3,86*	*96,03*	*2,6500*	*TT-TN*
SPAN								
Average on span			11,60	0,28	3,04	96,66	2,6150	Medium - Fine
Average on upper horizons			7,66	0,46	2,88	96,65	2,6045	LL-TT
Average on bottom horizons			13,25	0,07	3,81	96,10	2,6492	TT-TN
Average on Ahok(x)2 horizons			21,00	0,30	1,61	98,08	2,5626	Medium loamy clay (TT)

#Notations according with SRTS-2003 (Florea N., Munteanu I., 2003). ΔH [cm] – depth interval where the horizon appears; $\overline{H}$ [cm] – average depth where the soil horizon appears. *Gravimetric percents reported to raw soil sample. (1)Fraction Φ > 2.00 mm (soil skeleton). (2)Fraction Φ < 2.00 mm. ρ – absolute density. Ahok(x)2 – frangipane horizon (on pedogeochemical segregation). Upper horizons – above the Ahok(x)2 horizon. Bottom horizons – below Ahok(x)2 horizon.

Loss of material from grain size analysis were 0.68–1.14 % (average: 0.86 %), and the analysis errors (determined by triplicate measurements) have been estimated to ± 1.39 % (reported to raw soil quantity). The determination of absolute density was done by picnometric method, using samples with grain size < 0.02 mm and benzene as dispersion liquid (Bulgariu D., Rusu C., 2005).

pH has been determined by potentiometric method, suspension procedure (10 g soil / 50 mL solution, sample grain size < 0.01 mm) in twice distilled water and in 0.1 M KCl solution, with a pH-meter Basic 20+ type, equipped with a combine Crison glass electrode. The redox potential (E_h) was determined by direct method (suspension procedure, 10 g soil / 50 mL solution, sample grain size < 0.01 mm) using a potentiometer Basic 20+ model, equipped with a combined platinum Crison electrode (Bloom P.R., 2000; Bulgariu D. et al., 2005).

The total soluble salts content (TSS) was conductometric determined, in aqueous extract (1:5), with a conductometer EC-meter GLP 31+ model and a conductometric cell +Pt1000 Crison type. The electrical conductibility measurements (CE; μs/cm) have been converted in TSS mg /100 g soil) values, using the following semi-empirical equation: $CE = -0.0054xTSS^2 + 18.98xTSS - 63.633$ ($R^2 = 0.9848$; n = 54), obtained from experimental results. For the analytical control of results the TSS was determined and gravimetrically (Borlan Z., Răuță C., 1981).

The total phosphorus was analyzed spectrophotometrically (with ammonium molybdate, reduction with sodium bisulphite, λ_{max} = 660 nm) after dissolution with $HClO_4$ (20 mL / 1 g sample). Organic phosphorus was analyzed in the same manner, after extraction in HCl (hot and cold; 10 mL / 1 g sample) (Borlan Z., Răuță C., 1981; Pansu M., Gautheyrou J., 2006; Bulgariu D. et al., 2009).

RESULTS AND DISCUSSION

The soil from Copou greenhouse – Iasi has pedological and chemical-pedological properties (*tab. 1, 2, 3*) characteristic of mixic – proxicalcaric – hipohortic enthiantrosol (IS.1 profile), associated with proxicalcaric–hortic anthrosol (IS.2 profile). Although, the studied anthrosol occupies a relative small surface, the development of soil horizons is not uniform (*fig. 1, tab. 1*). The average thickness of the horizons ranged from 10.71 to 12.50 cm, with a span average of 11.60 cm. Better developed are the bottom horizons, whose thickness varied between 6 and 13 cm (average: 9.00 cm) in IS.1 profile and between 15–20 cm (average: 17.50 cm) in IS. 2 profile. Between horizons the most well developed in both profiles are Ahok, Ck and BCk.

The results of grain size analysis (*tab.2*) falling the soils from Copou greenhouse – Iasi in the class with medium and fine texture (*fig. 3*): medium loamy (LL) – Apk1 horizon; transition between medium loamy (LL) and medium clay loamy (TT) – Apk2 horizon; medium clay loamy (TT) –Ahok(x)1, Ahok(x)2, BCk and ABk horizons; sandy clay (TN) – Ck horizon (notation according with Florea N. et al., 2007). Between particle size fractions, the sand dominates (span average: 41.20 %) and clay (span average: 36.06 %). On profile is found a slight decrease of sand (cca. 2 %) and an accentuated increase of clay (cca. 6 %) in bottom horizons.

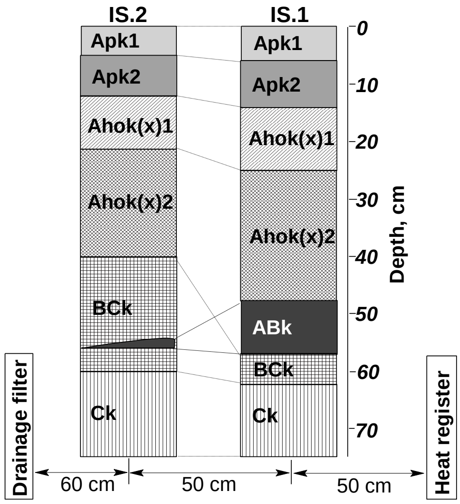

Figure 2 **Schematic representation of topo-sequences in anthrosols from Copou greenhouse – Iasi.**

The soil skeleton (> 2.00 mm) has an average content approximately constant on span and profile (1.48–4.26 %; average: 3.04 %) with lower values in upper horizons (2.88 %) in comparison with bottom horizons (3.81 %). The lowest values of skeleton are observed in case of Ahok(x)2 horizon (1.61 %).

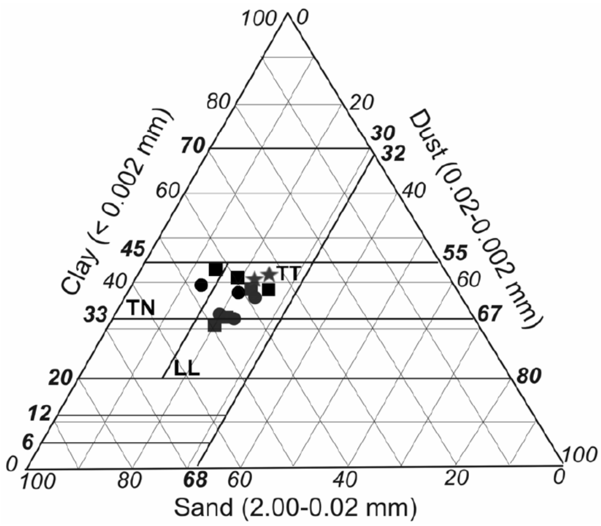

Figure 3 **Framing of studied soils in triangle diagram of texture** (according ICPA Bucharest methodology). Notations: ■ upper horizons; ● bottom horizons; ★ Ahok(x)2 horizon. Other notations – see *tab.1*.

The mineralogical composition of parental material has a relatively large variety, and the variation way on profile is slightly only influenced by pedogenetic processes. The parental material of anthrosol from Copou greenhouse – Iasi has many and different sources, and supply of materials was carried out periodically and differentiated (as texture and mineralogical-petrographical nature). Heavy minerals and rock fragments have an atypical variability and shows weak correlations with other chemical-mineralogical components of anthrosol.

The grain size fraction 2.00–0.02 mm (sand): (i) varied on span between 33.04 and 45.09 %, with an average of 39.81 %; (ii) average contents are not significantly different between upper and bottom horizons; (iii) fine sand has the dominant weight – the ratio between fine and rough sand varied between 4.13–22.89 (average: 9.74), with maxim values at Ahok(x) horizon; (iv) chemical-mineralogical composition of sand is varied, both in terms of contents, and in the mineralogical-petrographic nature of components – dominants are primary minerals (quartz, feldspars, biotite, chlorite, dolomite, heavy minerals – magnetite, garnet, rutile, zircon, tourmalin, hornblende, etc.) and granules of different rocks (gneiss, mica-schist, quartzite–schists, andezite, marls etc.) associated with their weathering products; apparition frequencies, occurrence forms and distribution way on profile, and even in the same horizon does not indicate characteristic variations and association ways for the mineralogical-petrographic components from sand.

Table 2

Results of grain size analysis for the anthrosol from Copou greenhouse – Iasi

horizons	ΔH; cm	Sand (2.00–0.02 mm)			Dust (0.02–0.002 mm)			Clay (< 0.002 mm)			
		N_t	N_g	N_f	P_t	P_g	P_f	A_t	A_g	A_f	$A_{fiz.}$
IS.1 PROFILE											
Apk1	0 - 6	45.09	6.15	38.94	18.75	10.35	8.40	30.19	17.91	12.28	23.26
Apk2	6 - 14	42.65	4.83	37.82	20.53	8.76	11.77	31.76	15.35	16.41	28.66
Ahok(x)1	14 - 25	37.52	1.57	35.95	21.60	5.33	16.27	36.93	10.36	26.57	41.95
Ahok(x)2	25 - 48	36.47	1.91	34.56	20.07	4.28	15.79	39.86	5.35	34.51	52.33
BCk	48 - 56	34.94	3.42	31.52	24.18	6.98	17.20	36.19	11.91	24.28	38.95
ABk	56 - 62	36.86	5.88	30.98	18.46	8.35	10.11	38.75	18.16	20.59	34.13
Ck	62 - 75	39.52	7.69	31.83	13.29	7.51	5.78	41.61	23.82	17.79	30.46
Average on profile		*39.01*	*4.49*	*34.51*	*19.55*	*7.36*	*12.18*	*36.47*	*14.69*	*21.77*	*35.68*
Average on upper horizons		*41.75*	*4.18*	*37.57*	*20.29*	*8.14*	*12.14*	*32.96*	*14.54*	*18.42*	*31.29*
Average on bottom horizons		*37.11*	*5.66*	*31.44*	*18.64*	*7.61*	*11.03*	*38.85*	*17.96*	*20.88*	*34.51*
IS.2 PROFILE											
Apk1	0 - 5	43.83	5.67	38.16	21.07	9.76	11.31	28.75	16.26	12.49	23.53
Apk2	5 - 12	44.26	7.04	37.22	19.55	9.15	10.40	32.51	15.83	16.68	29.01
Ahok(x)1	12 - 21	38.11	2.36	35.75	23.15	5.91	17.24	34.26	9.16	25.10	40.03
Ahok(x)2	21 - 40	33.04	2.15	30.89	22.46	6.33	16.13	40.57	12.76	27.81	43.57
BCk	40 - 60	39.40	4.59	34.81	23.07	8.48	14.59	39.83	19.08	20.75	34.34
Ck	60 - 75	45.08	8.15	36.93	11.22	5.93	5.29	38.05	17.33	20.72	34.30
Average on profile		*40.62*	*4.99*	*35.62*	*20.08*	*7.59*	*12.49*	*35.66*	*15.07*	*20.59*	*34.13*
Average on upper horizons		*42.06*	*5.02*	*37.04*	*21.25*	*8.27*	*12.98*	*31.84*	*13.75*	*18.09*	*30.86*
Average on bottom horizons		*42.24*	*6.37*	*35.87*	*17.14*	*7.20*	*9.94*	*38.94*	*18.20*	*20.73*	*34.32*
SPAN											
Average on span		39.81	4.74	35.07	19.82	7.47	12.34	36.06	14.88	21.18	34.90
Average on upper horizons		41.91	4.60	37.30	20.77	8.21	12.56	32.40	14.14	18.25	31.07
Average on bottom horizons		39.67	6.01	33.65	17.89	7.40	10.48	38.89	18.08	20.81	34.42
Average on Ahok(x)2 horizons		34.75	2.03	32.72	21.26	5.30	15.96	40.21	9.05	31.16	47.95

N_t – total sand content (2.00–0.02 mm). N_g – rough sand (2.00–0.20 mm). N_f – fine sand (0.20–0.02 mm). P_t – total dust content (0.02–0.002 mm). P_g – rough dust (0.02–0.01 mm). P_f – fine dust (0.01–0.002 mm). A_t – total clay content (< 0.002 mm). A_g – rough clay (0.002–0.001 mm). A_f – fine clay (< 0.001 mm). $A_{fiz.}$ – physic clay (< 0.01 mm): $A_{fiz.} = 1.2xA_t + 6$ (Canarache A., 1990). Other notations – see. *tab. 1*.

The grain size of 0.020–0.002 mm (dust): (**i**) on span, the content varied between 11.22 and 23.15 %, (average: 19.82 %), with a proportion subordinate of sand and clay; (**ii**) the average contents are not significantly different between upper and bottom horizons; the maximum observed in case of Ahok(x)2 and BCk horizons are correlated with processes of frangipane formatin, argilization and clay-luviation, or stagnogleization in case of Ck horizon, respectively; (**iii**) fine dust has dominant proportion – the ratio between fine and rough dust varied between 0.76 an 3.68, with maximum values in case of Ahok(x) horizon; the intensity of these variations are lower than in case of sand; (**iv**) variations on profile of fine and rough dust are antagonistic, trends on profile is the increase for fine dust and decrease in case of rough dust; (**v**) in case of Ahok(x) horizons, the fine dust has dominant weight reported to the total dust content – on span, the fine dust / rough dust ratio in case of Ahok(x) horizons is 3.11; (**vi**) the chemical-mineralogical composition has a more reduced variability than in case of sand – quantitatively dominant are clay minerals, oxides and oxy-hydroxides of silica (amorphous silica, SiO_2), aluminium and iron, phosphates and sulphates (mainly basic, present as amorphous varieties), etc.; to these are added in varying amounts form horizon to horizon, primary minerals (feldspars, chlorite, biotite, magnetite, garnet etc.).

Table 3

Physical-chemical characteristics of anthrosol from Copou greenhouse – Iasi

Horizons	ΔH; cm	pH_{H_2O}	pH_{KCl}	E_h; mV	rH[(1)]	TSS[(2)]	Phosphorus; µg P_2O_5 / g soil			
							P(T)	P(A)	P(O)	P(NO)
IS.1 PROFILE										
Apk1	0 - 6	7,91	6.36	521.37	33.79	675.49	747.15	350.48	396.66	734.67
Apk2	6 - 14	8.28	7.12	495.06	33.63	315.51	439.72	208.21	231.51	426.74
Ahok(x)1	14 - 25	7.84	6.95	365.19	28.27	369.73	325.81	125.63	200.17	308.05
Ahok(x)2	25 - 48	6.59	6.31	296.45	23.40	417.61	658.36	141.48	516.87	583.37
BCk	48 - 56	6.04	5.56	249.62	20.68	288.38	112.59	60.99	51.60	108.94
ABk	56 - 62	5.41	5.29	214.77	18.22	152.95	94.57	54.67	39.89	90.09
Ck	62 - 75	6.17	5.43	211.81	19.64	305.82	124.55	77.56	46.98	115.21
Average on profile		*6.89*	*6.14*	*336.32*	*25.38*	*360.78*	*357.53*	*145.57*	*211.95*	*338.15*
Average on upper horizons		*8.01*	*6.81*	*460.54*	*31.90*	*453.57*	*504.22*	*228.10*	*276.11*	*489.82*
Average on bottom horizons		*5.87*	*5.42*	*225.40*	*19.51*	*249.05*	*110.57*	*64.40*	*46.15*	*104.74*
IS.2 PROFILE										
Apk1	0 - 5	8.03	6.64	517.83	33.91	688.02	768.05	362.12	405.93	740.09
Apk2	5 - 12	8.19	6.97	508.44	33.91	340.76	457.61	230.56	227.05	439.67
Ahok(x)1	12 - 21	6.81	5.77	336.06	25.20	357.19	367.18	147.97	219.21	341.05
Ahok(x)2	21 - 40	6.35	5.68	301.38	23.09	429.41	703.27	139.66	563.60	633.50
BCk	40 - 60	5.87	5.25	263.55	20.82	315.83	121.75	57.96	63.79	116.62
Ck	60 - 75	6.03	5.09	220.08	19.64	298.61	105.63	69.18	36.45	98.25
Average on profile		*6.88*	*5.90*	*357.89*	*26.10*	*404.97*	*420.58*	*167.90*	*252.67*	*394.86*
Average on upper horizons		*7.67*	*6.46*	*454.11*	*31.01*	*461.99*	*530.94*	*246.88*	*284.06*	*506.93*
Average on bottom horizons		*5.95*	*5.17*	*241.81*	*20.23*	*307.22*	*113.69*	*63.57*	*50.12*	*107.43*
SPAN										
Average on span		6.88	6.02	347.10	25.74	382.87	389.05	156.74	232.31	366.51
Average on upper horizons		7.84	6.63	457.32	31.45	457.78	517.58	237.49	280.08	498.37
Average on bottom horizons		5.91	5.29	233.60	19.87	278.13	112.13	63.98	48.13	106.09
Average on Ahok(x)2 horizons		6.47	5.99	298.91	23.24	423.51	680.81	140.57	540.23	608.43

pH_{H_2O} - pH in water. pH_{KCl} - pH in 0.1 M KCl. E_h – redox potential. [(1)]Calculated with relation: rH = 34.4827xE_h + 2xpH. [(2)]Total contents of soluble salts, in mg / 100 g soil. P(T) – phosphorus total content. (PA) – inorganic phosphorus. P(O) – organic phosphorus. P(NO) – non-occluded phosphorus (extractable in acetate - lactate). Other notations – see *tab. 1*.

The size fraction < 0.002 mm (clay): (**i**) content varied between 28.75 and 41.61 % (average: 36.06 %), with weight close to the sand; (**ii**) average contents from upper horizons (28.75–36.93 %; average: 32.40 %) are lower than those from bottom horizons (36.19–41.61 %; average: 38.89 %); (**iii**) fine clay has the dominant weight – the ratio between fine and rough clay varied between 0.68–6.45 (average: 1.97), with maxim values in case of Ahok(x) horizon; the amplitude of these variations is less than for sand; (**iv**) profile variation of fine and rough clay are synchronous, trends is the accumulation in Ahok(x) horizons and subordinated in bottom horizon; from our point of view, the accumulation tendency of fine clay in Ahok horizons represent a characteristic of anthrosols from protected area and a formation condition of frangipane and proto-frangipane horizons; (**v**) chemical-mineralogical composition of clay has a reduced variability than dust and sand, which is reflects in the variation and diversity within narrower of chemical-mineralogical components – dominants are clay minerals, oxides and oxy-hydroxides of silica (amorphous silica), aluminium and iron (predominantly colloidal), to which are added, in variable amounts, from horizon to horizon, carbonates, sulphates, phosphates (mainly basic, present as amorphous varieties), chlorides, nitrates, different amorphous silicates and aluminium silicates gels; the chemical-mineralogical components of clay are found almost invariant in the composition of soil aggregation binder.

The pH (H_2O), varied between 5.41 and 8.28 (average: 6.88), with higher values in superior horizons (5.41–6.17; average: 5.91). On profile, trend is the decrease in pH, and the variations of pH(H_2O) and pH_{KCl} are similar and synchronic. According with pH values, the soils from Copou greenhouse – Iasi are fall in weak alkaline – upper horizons and weak acid – bottom horizons, respectively.

The redox potential (E_h) varied between 211.81 and 521.37 mV (average: 347.37), with higher values in upper horizons (336.06–521.37 mV; average: 457.32) in comparison with bottom horizons (211.81–263.55 mV; average: 233.60), and has an accentuate decrease tendency on profile. According with E_h values, the upper horizons correspond to oxidizing conditions, and the bottom horizons to weakly reducing conditions.

The total content of soluble salts (TSS) varied between 152.92 and 688.02 mg/100 g soil (average: 382.87), with higher values in upper horizons 315.51–688.02 mg/100 g soil; average: 457.78) in comparison with those bottom horizons (152.95–315.83 mg/100 g soil; average: 278.13) and an accentuated downward trend on profile. According with TSS values, the upper horizons are strong (Apk1) and moderate (Apk2, Ahok(x)1 and Ahok(x)2) salinized, and the bottom horizons are weak salinized.

CONCLUSIONS

The soil studied in Copou greenhouse – Iasi is an mixic – proxicalcaric – hipohortic enthiantrosoil (profile IS.1), associated with proxicalcaric – hortic anthrosol (profile IS.2). Characteristic for this anthrosol is the formation at depths of 12–48 cm of Ahok horizons, proto-frangipane or frangipane, determining the differential evolution of pedogeochemical processes in soil profiles (pedogeochemical segregation phenomena). The studied soils fall within the class of medium and fine texture, the dominant grain size fractions being sand and clay. The fine fractions has dominant weight, and the variations of the ratio between fine and raw fractions present maximum values at Ahok(x)1 and Ahok(x)2 horizons. This migration and accumulation tendency of fine grain size fraction at the Ahok(x)2 horizon level represent one of the condition of frangipane horizons formation and developing of pedogeochemical segregation phenomena. For upper horizons of profiles are characteristic neutral conditions–weak alkaline and moderate oxidizing, with high-moderate salinity, and for bottom horizons are characteristic neutral conditions–weak acid and moderate reducing, with reduced salinity.

ACKNOWLEGMENTS

Financial support for the studies was provided by the Ministry of Education and Research, Romania – A.N.C.S (contract PNCDI no. 51045 / 2007).

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