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THE CHARACTERIZATION OF THE SOILS FROM NEARBY CRAIOVA CHEMICAL PLANT AND POWER PLANT

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Abstract: *The soil protection and preservation represents the main modern agriculture task while the industry and other economic branches dispose important quantities of noxes and wastes that are stored upon the soil surface and get into it determining the disturbing of the natural processes of soil genesis and life. Within the soil, like any other ecosystem there are unfolded multiple and complex reactions from where there results complex products that are present within the plant structure and other living organisms and this is the reason why in an intensive agriculture there must be taken all measures for soil protection so it can produce nutrients and biomass. The practice has demonstrated that the soil has a fragile ecological equilibrium that can easily changed by polluting action of some internal or external factors. The achieving of the proposed theme can be considered very important being included into the prior domain of sustainable development on Romania land, of preserving the biodiversity and environment quality and minimization of global changes. The proposed researches have to respond to some clear objectives of identifying the causes and understanding the mechanisms of deterioration of the structure and quality of natural and human environment components of reducing the risk and the natural and human impact on the complex social and ecological relations from the nearby zone to the Craiova Chemical Plant and Power Plant. The researched zone stretches on a 30 km distance away of Craiova Chemical Plant and Power Plant. In order to know the soils and their features there have been made researches on field and laboratory analyses. Within the studied zone there were identified reddish preluvosoils, preluvosoils, vertosoils, sandy soils, mollic glyosoils and alluvial soils.*

Key words**:** *soil profile, humus, permeability, reaction, bases saturation degree*

INTRODUCTION

The rational using of country land is an important activity of science and technology due to the fact that the soil is the main production mean in agriculture of which highly depends the populace food. The preservation of the soil productivity has the following objectives: sustainable improving of soil physical, chemical and biological features related with plants requirements; diminishing and controlling the degradation products of physical, chemical and biological nature; improving or maintaining the water and nutrient regime; maintaining and increasing the production capacity of soils; protection and ameliorating the environment.

These requirements are according with the prioritary goal of sustainable agriculture on Romania territory of preserving biodiversity and the quality of the environment and mitigation of global changes.

The present paper deals with researches made on a 30 km radius around Chemical Plant of Craiova and the Pwerplant in order to describe soils and their features.

MATERIAL AND METHODS

The researches have been carried out according with requirements of National Institute for Pedology, Agrochemistry and Environment Protection Bucharest by making studies and laboratory analyses. By field researches there were identified the main soil types. By laboratory analyses there were determined the main physical and chemical features of soils that have been used to appreciate the fertility and the production potential of soils.

RESULTS AND DISCUSSIONS

The identified soils from polluted zone by chemical plant and powerplant are: preluvosoils, vertisoils, sandy soils, gleysoils and aluvosoils.

The preluvosoils occupy the researched zone on a large scale and there were identified: typical preluvosoil, vertic preluvosoil, reddish preluvosoil and reddish vertic preluvosoil. The typical preluvosoil is encountered in the western part and south western part of the studied zone and it was formed on materials rich in bases elements and they occupy terrains with a good drainage with southern exposure. The soil profile is: Ao – AB – Bt – C. It has a silty clayey texture, low permeability for air and water, middle supplied by humus and nutrients, the reaction is low acid and the bases saturation degree is over 80% (table 1).

In the versant zone there is the middle or highly eroded preluvosoil.

The vertic preluvosoil is located in the northern part and north-western part of the studied territory. It was formed on swelling clay and has the following profile: Ao – AB – By – C. This soil is characterized by clayey silty texture, rough structure, low permeability for air and water, middle supplied by humus and nutrients, low acid reaction, bases saturation degree over 80%, tillage heavily (table 2).

The reddish preluvosoil occupies a large surface in the eastern and southern part of Craiova chemical plant and powerplant. It was formed on sands and silt on plain terrains with good drainage or on low declined versants. It has the following profile: Ao – AB – Bt –C with an Ao horizon well developed on flat zones and slimmer on slope terrains due to surface erosion and with a profound Bt horizon differentiated as Bt1, Bt2 and Bt3. The soil texture is silty the soil is middle compacted, the reaction is low acid, middle supplied by humus and nutritive elements, the bases saturation degree is more than 75% (table 1).

Table 1

The main features of the preluvosoils from nearby zone of chemical plant and powerplant Craiova

Soil	Horizon	Depth cm	Sand %	Loam %	Clay %	Tp %	H %	pH	V%
Preluvosoil	*Ao*	0-29	41.3	22.4	36.3	50	2.72	6.6	85
	AB	30-43	37.2	20.6	42.2	48	1.37	6.7	88
	Bt1	44-84	35.8	22.9	41.3	46	0.87	6.9	93
	Bt2	85-135	36.0	23.1	40.9	45	0.62	7.1	95
Vertic preluvosoil	*Ao*	0-31	31.7	22.9	45.4	46	2.75	6.3	85
	AB	32-49	29.8	23.7	46.5	42	1.43	6.4	84
	Bt1y	50-97	26.3	22.4	51.3	41	0.73	6.5	83
	Bt2y	98-133	29.7	19.8	50.5	42	0.51	6.7	87
Reddish preluvosoil	*Ao*	0-29	49.8	21.5	26.7	48	2.49	6.0	78
	AB	30-49	45.0	21.0	34.0	45	1.52	6.1	79
	Bt1	50-97	42.6	21.3	36.1	42	0.62	6.4	82
	Bt2	98-149	44.6	20.9	34.5	42	0.53	6.7	85
Reddish luvic preluvosoil	*Ao*	0-22	37.4	23.2	39.4	48	2.15	5.7	67
	El	23-36	39.5	22.8	37.7	46	0.92	5.1	57
	Bt1	37-110	29.5	19.9	50.6	43	0.61	5.8	74
	Bt2	111-192	28.5	19.3	52.2	44	0.47	5.9	75
Reddish luvic preluvosoil	*Ao*	0-26	45.1	21.0	33.9	46	2.10	5.8	75
	ABy	27-43	38.7	24.6	36.7	42	1.02	5.6	73
	Bty	44-55	30.2	21.6	38.2	41	0.66	5.6	76
	Bt	56-161	28.1	21.7	50.2	41	0.51	6.1	80

The reddish luvic preluvosoil is located on larger surfaces than the reddish preluvosoil being encountered on plain terrains with low drainage in microdepressions and on versants with northern exposure and low slope where higher moisture makes the alteration processes more intense as well as leaching. The soil profile is: Ao – El – Bt1 – Bt2. The Ao horizon is slim, the El horizon has light color due to silica accumulation and the Bt horizon is well developed and show stagnic and gleysation processes within the superior third part. The soil texture is middle, the compaction is middle, as well, and the reaction is acid. The soil is low supplied by humus and nutrients and the bases saturation degree is under 75% (table 1).

The vertic reddish preluvosoil occupies small areas and it was formed on swelling clay. The soil profile is: Ao – Aby – Bty – Bt – C. The vertic processes are evident in the superior part. It is a compact soil with low permeability for air and water, low supplied by humus and nutrients, low acid reaction, bases saturation degree over 70% (table 1). This soil is worked heavily.

The vertisoils are encountered within the influence zone of chemical plant and powerplant. It was formed on clay of montmorillonitic type that determined intense processes of bulk variation being characterized by frequent inversions of the layers within its mass. The soil profile is: Ay – Aby – By – C. The texture is fine due to high clay content and low sand content (table 2).

Table 2

The main features of the vertisoil from influence zone of chemical plant and powerplant from Craiova

Horizon	Depth cm	Sand %	Loam %	Clay %	Tp %	H %	pH	V%
Ay	0-27	29.2	25.9	44.9	47	2.57	5.5	68
ABy	28-43	25.9	23.4	50.7	45	1.37	5.7	74
Bty1	44-76	25.2	20.7	55.1	43	0.63	5.8	83
Bty2	77-131	28.1	19.8	51.1	42	0.47	7.2	87

It is a hard soil, compact, cool and with very low water and air permeability, tillage are performed heavily and the tillage optimal time is short. During dry spring on this soil there are encountered frequent cracks and slots of different depths. This soil is low supplied by humus and nutritive elements, its reaction is acid to low acid and the bases saturation degree is under 65%.

The mollic gleysoils have been encountered in low zones (depressions) and in Jiu lowland where the watertable is shallow. In these conditions there are produced intense processes of reduction of soil compound that conduct to the formation of gleysated horizon. The soil profile is: Am – Ago – Gr. The Am horizon is well developed, of dark color, fine texture, high humus content and nutrients, low alkaline reaction and the bases saturation degree is 100% (table 3).

Table 3

The main features of the mollic gleysoil from influence zone of chemical plant and powerplant from Craiova

Horizon	Depth cm	Sand %	Loam %	Clay %	Tp %	H %	pH	V%
Am	0-40	24.6	28.0	47.4	47	4.4	7.1	100
Ago	41-70	21.7	31.1	47.2	44	1.94	7.3	100
Gr	71-95	22.5	29.8	47.7	43	0.75	7.4	100

Aluvosoils are located in Jiu River lowland, Amaradia lowland and along the influence zone of the chemical plant and powerplant from Craiova and they formed on eroded materials and transported by water. They show a high degree of solification determined by the chemical and mineral composition of transported and deposited materials and the fact that flooding is seldom in this area. They are characterized by a short soil profile formed of two horizons, Ao and C. The texture of these soils is different and concentrated on the depth of soil profile due to the deposited materials in layers, they are middle supplied by humus and nutrients (table 4), they have a neutral reaction or alkali and the bases saturation degree is higher than 70%.

The psamosoils occupy a small area. They formed on sandy materials in the confluence zone of Jiu and Amaradia rivers. They have a sandy or sandy loamy texture, are not structurated, with high air and water permeability, low cohesion, frequently drifted. The humus and nutrient is low, under 1% (table 4) because all organic debris in small quantity are rotted in excessively aerobic conditions. The water and nutrient storing capacity is low.

Table 4

The main features of the protisoils from nearby zone of chemical plant and powerplant Craiova

Soil	Horizon	Depth cm	Sand %	Loam %	Clay %	Tp %	H %	pH	V%
Aluviosoil	*Ao*	0-40	50.5	24.0	25.5	48	2.73	6.5	100
	AC	41-55	48.9	20.6	22.5	47	1.31	6.8	100
	C	‹55	39.9	22.1	38.0	45	0.62	6.9	100
Psamosoil	*Ao*	0-41	96.4	1.3	2.3	47	0.51	6.5	84
	AC	42-78	96.6	1.2	2.2	45	0.31	6.3	85
	C	‹78	96.5	1.4	2.1	45	0.02	6.3	85

CONCLUSIONS

Within the influence zone of the chemical plant and powerplant from Craiova there are encountered a complex of soils from sandy soils that are permeable and highly aerated, to the clayey ones, that are very compact and with very low air and water permeability.

Some soils are very low supplied by humus (sandy soils under 1%) and others are middle supplied (aluviosoils 2-3%).

The reaction oscillated from acid (pH 5.5 with reddish luvic preluvosoil) to neutral or low alkaline (pH 7.1 with mollic gleyosoil).

The colloidal complex and the bases saturation degree have high values with the preluvosoil, aluviosoil and vertosoil while with sandy soil and luvic reddish preluvosoil these features are less favorable for plant growing. The sandy soil being poor as regard the colloidal complex reacts abruptly to the pollution phenomenon because its buffering capacity is low.

As regard the presented features there can be said that the sandy soils have a very low fertility, followed by luvic reddish preluvosoils and vertosoils. The preluvosoils and the reddish preluvosoils have, generally, a middle fertility degree.

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