THE MAIN ANTHROPIC SOILS (SPOLIC ENTIANTROSOILS) ENCOUNTERED IN THE MINING BASIN OF OLTENIA ON SURFACES AFFECTED BY SURFACE QUARRIES

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Abstract: *The economic activities that produce radical changes to soils are mainly represented by mining industry by surface coal extraction. The surface mining is the most aggressive for of soil degradation. After the surface mining, by excavation and depositation processes the damage on soil is harsh, the soil factor totally dissapearing and at the surface there appear new downward rocks. These soil types are brand new in this domain of anthropic soils and we emphasize the physical and chemical features of them, their fertility degree and their classification. There have been analyzed the following anthropic soils: spolic entiantrosoil Sandy silty on sands from Berbesti Rosia de Amaradia mining basin; spolic entiantrosoil silty on silt from Motru – Valea Manastirii mining basin; spolic entiantrosoil Silty sandy sandy on sands from Rovinari – Rapa mining basin; spolic entiantrosoil clay silt on clays from Rovinari Rapa mining basin; spolic entiantrosoil sandy silty/silty sandy on sands and silt from Turceni – Balteni mining basin; spolic entiantrosoil silty on silt from Turceni – Urdari mining basin.*
These anthropic soils have the following physical and chemical features: the soil reaction is highly acid to moderate alkali (pH = 4.9 – 8.5); the organic matter content is between 0.16 to 6.09%; the available phosphorus content is 3.2 – 49 ppm low to well supplied; the available potash content is 22 to 172 ppm very low to average supplied; the sum of exchangeable bases (SB) 7.2-39.5 me/100 g soil; the bases saturation degree (V) is around 74.5%; the texture is heterogenous from sandy to clay – silt yet predominates the sandy silty materials, silty or silty sandy (60%). On the soil profile the soil can homogenous or heterogenous as texture, color, compactity and consistency. They have no structure. The paper is original being the first complex study on entriantrosoils from mining zones in order to classify these soils.

Key words**:** *spolic entiantrosoil, sterile dumps, soil reaction, bases sum, available phosphorus, available potassium*

INTRODUCTION

The economical activity that radically affects soils is mainly represented by mining industry by open cut extraction of lignite. The open cut mining of lignite is the most aggresive form of soil degradation. After open cut quarries by excavation and deposition processes the impact on soil is very harsh, the soil practically dissapearing (MOCANU, 2007).

The place of former soils there have been brought to surface diverse lithological materials of different geological ages of high physical and chemical diversity. After open cut coal extraction, along radical changes there take place important changes of the environment, the initial landscape being totally changed, the place of former soil being taken by sterile dumps and anthropic soils recently called anthropic soils after SRTS 2003 entriantrisoils (MUNTEANU, 2003).

MATERIAL AND METHODS

In order to research these soils within the Oltenia mining basin he have studied the main anthropic soils (spolic entriantrosoil) and we present in this paper four of them.

These soils have been described both pedologically and agrochemically as regard the following aspects:

- the soil profile with geological layers;
- size analysis;
- the main agrochemical features;

RESULTS AND DISCUSSIONS

The first soil unity, Motru mining basin, Valea Manastirii sterile dump

The name of the soil is spolic entriantrosoil, formed on silt (NEGREA, 2009).

Morphological description: S_1 – (0-18 cm), yellow, light brown, not structurated, silty. It contains lime in the soil mass and frequent roots, it makes high effervescence, porous, low compact, moist, slow passing to the next layer.

S_2 – (18-39 cm), light brown, roughly structure, poor defined, silty. It contains lime within the soil mass and rare roots, it makes high effervescence, middle porous, low compact, wet, slow passing to the next layer.

S_3 – (39-61 cm), yellow-grey, not structurated, clayey-silty. It contains lime within the soil mass and rare roots, it makes high effervescence, middle porous, low compact, wet, slow passing to the next layer.

S_4 – (61-76 cm) brown, not structurated, silty. It contains lime within the soil mass and rare roots, it makes high effervescence, middle porous, low compact, wet, slow passing to the next layer.

S_5 – (76-90 cm) brown, not structurated, silty. It contains lime within the soil mass and rare roots, it makes high effervescence, middle porous, low compact, wet, slow passing to the next layer.

S_6 – (90-150 cm) brown yellow, not structurated, silty-clayey. It contains lime into the soil mass.

Table 1

The physical and chemical data

layer	pH	Lime %	H %	P ppm	K ppm	V %	Size fractions %					Texture
							1	2	3	4	5	
S_1	8.2	15.6	1.31	164	1.3	100	1.2	39	28	46	31	Sandy
S_2	8.0	11.4	0.75	96	1.8	100	1.3	49	20	42	28	Silty
S_3	7.9	4.8	0.66	152	0.7	100	1.4	20	27	69	48	Clay-silty
S_4	7.9	12.5	2.8	96	0.6	100	3.1	53	12	43	31	Silty
S_5	7.8	10.2	1.18	103	0.7	100	4.2	45	19	44	31	Silty
S_6	7.8	13.9	2.8	100	0.7	100	2.2	39	22	51	36	Silty-clayey

1 – thick sand; 2 – sand; 3 – silt; 4 – physical clay; 5 – colloidal clay.

The second soil unity, Rovinari mining basin, Valea Scoretii sterile dump.

Name of the soil is spolic antriantrosoil silty-clayey/clayey-silty on silt and clay.

Morphological description

S_1 – (0-20 cm) brown grey, not structured, silty-sandy-clayey, frequent roots, middle porous, low compact, moist, abrupt passing to the next layer.

S_2 – (20-39 cm) dark brown black, not structurated, silty – clayey- silty, porous, low compact, moist, abrupt and corrugated passing to the next layer.

S_3 – (39-70 cm) yellow, not structurated, clayey – silty, coal debris, very rare roots, porous, low compact, moist, slow passing to the next layer.

S_4 – (70-95 cm) purple, not structurated, clayey with coal debris, fine porous, compact, moist, abrupt and corrugated passing to the next layer.

S_5 – (95-150 cm) yellow rusty, not structurated, silty clayey, with coal debris, middle porous, low compact and moist.

Table 2

The physical and chemical data

layer	pH	Lime %	H %	P ppm	K ppm	Size fractions %					Texture
						1	2	3	4	5	
S_1	7.8	12.4	1.4	34.2	78	40.8	50.4	24.5	39.0	24.3	Silty sandy
S_2	7.6	9.1	2.2	23.4	82	14.8	25.0	20.1	51.4	40.1	Silty clayey
S_3	7.9	7.5	1.0	56.1	84	7.4	26.4	20.1	59.1	46.4	Clayey silty
S_4	7.8	4.6	2.9	41.3	126	0.3	1.4	32.5	33.5	65.8	Clayey
S_5	7.8	8.3	2.2	34.2	290	10.3	26.2	25.0	49.9	38.5	Silty clayey

1 – thick sand; 2 – sand; 3 – silt; 4 – physical clay; 5 – colloidal clay.

The third soil unity, Turceni mining basin, Pesteana sterile dump.
Name of the soil is spolic entriantrosoil sandy silty/silty sandy on sands and silt.
Morphological description
S_1 – (0-16 cm) brown, not structurated, sandy silty, frequent roots, porous, low compact with slow and corrugated passing to the next layer.
S_2 – (16-24 cm) yellowish, not structurated, sandy silty. It contains lime within the soil mass, rare roots, porous, low compact, dry, slow and corrugated passing to the next layer.
S_3 – (24-68 cm) yellowish rusty, not structurated, silty sandy, very rare roots, middle porous, middle compact, slow passing to the next layer.
S_4 – (68-116 cm), black rusty, not structurated, silty. It contains lime within the soil mass, middle porous, middle compact with slow and corrugated passing to the next layer.
S_5 – (116 – 150 cm), rusty with purple hue, not structurated, porous, low compact, dry.

Table 3

The physical and chemical data

layer	pH	Lime %	H %	P ppm	K ppm	Size fractions %					Texture
						1	2	3	4	5	
S_1	7.0	-	0.6	16.3	39	43.7	38.9	8.2	13.0	9.2	Sandy silty
S_2	7.6	0.4	2.9	17.4	48	33.3	41.3	14.2	19.2	11.2	Sandy silty
S_3	7.9	0.6	2.2	17.1	56	26.6	44.4	15.9	22.4	13.1	Silty sandy
S_4	7.7	2.6	1.2	12.1	72	18.8	42.3	16.3	31.3	22.6	Silty
S_5	7.1	-	1.7	14.5	34	57.8	29.1	8.9	15.1	10.2	Sandy silty

1 – thick sand; 2 – sand; 3 – silt; 4 – physical clay; 5 – colloidal clay.

The analysis of the upward data with the three soil profiles emphasizes the following aspects:

- the soil reaction is low or moderate alkaline
- the lime content does not overpass 13.9%
- the humus content is low of 0.6-2.9% being influenced by the lignite dust
- the available phosphorus content ranges between 12.1-161 ppm from low to well supplied;
- the available potassium content is of 0.6-126 ppm, very low to middle supplied;
- the texture is very heterogenous from sandy to clayey silty yet the sandy silty materials predomine. Within this textural variability the colloidal clay has values between 2.2 – 72.8%, the thick and fine sand has very wide limits from 0.6-47% as well as silt, of 3.7-51.6%.

The soil can be either homogenous or heterogenous on different areas as: texture, color, compactity and consistency. They are not structured soils.

CONCLUSIONS

- After open cut mining the former soils are replaced by sterile dumps that are a mixture of different geological materials;
- The resulting soils are called spolic entriantrosoils and they are not structurated and have no horizons but layers;
- The physical and chemical features of these soils are not favorable for crops and they need reclaiming measures

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