

## A NEW METHOD OF EVALUATING THE ANTHROPIC SOILS FROM STERILE DUMPS

R. MOCANU, Ana Maria DODOCIOIU, C. NEGREA

*University of Craiova, Libertății 19*

*Corresponding author: mocanuromulus@yahoo.com*

**Abstract:** Applying the classic method of evaluation of soils „Romanian system of soil evaluation” the anthropic soils from mining quarries (sterile dumps) are considered to have almost the same productive potential with a natural soil as well as the evaluation marks. The goal of the present paper is to identify and adjust these indicators of the romanian system of evaluation in such manner the terrains affected by surface mining to be correctly evaluated. The researches carried out for the first time in our country in the domain of evaluating the entriatrosols from sterile dumps have taken in account the changing and adjusting three of the romanian system of soil evaluation, namely soil texture under the form of textural variation, the humus reserve calculated on the basis of C/N ratio and the edafic volume determined on the basis of impenetrable formations for the root system of plants that were called „nodules” in such manner to reflect the reality of the production capacity of these anthropic soils from the mining basin of Oltenia. In this manner, the quality classes were as follows: class II with an evaluation mark of 63 points for the spolic entiatrosoil; class III with an evaluation mark of 43 points for the spolic entiantrosoil in conditions of homogenous texture and modified edafic volume; class IV with an evaluation mark of 36 points for the spolic entiantrosoil in conditions of heterogenous texture; Class V with an evaluation mark of 24 points. The improving of the evaluation system of soils with changes brought by the present paper for sterile dumps of 19,140 ha is important for: - elaborating pedological studies of class quality when the land is given back to the former owners in order to express the reality of the production capacity; - establishing the proper zones for cropping different crops for capitalisation of the land; - correct expression of the quality of natural and anthropic soils resulted from mining activity.

**Key words:** evaluation, indicators, entiantrosols, quality classes, nodules, favorability classes

### INTRODUCTION

The evaluation of the agricultural soils is a complex operation of research that determine and appreciate the technical quality and production capacity of soils by using a sistem of technical indicators and evaluation marks (TEACI, 1980).

The objective of the evaluation is the terrain seen as a habitat for plants with all its ecological features that acts simultaneously on each territory.

As regard the goal, the evaluation can be splitted in two domains as follows:

- technical evaluation of agricultural land;
- economical evaluation of their productivity;

Applying the „The metodology of the romanian sistem of evaluation” for anthropic soils from sterile dumps their production potential is the same or a little bit lower than of a normal soil that has evolved in time. Also, the evaluation marks calculated on the basis of this system for anthropic soils with the main field crops are or significantly close to those of a normal soil of eutricambosoil type and much higher than stagnic luvisoil that do not reflect the reality, respectively the low fertility degree of these soils (VIOLETA CORIGOIU, 2005, FODOR, 1980).

In this respect the researches have tried to improve the Romanian system of soil evaluation and its adapting to the entiantrosols from sterile dumps.

**MATERIAL AND METHODS**

The researches have accounted the changing and adapting three of the indicators of Romanian system of soil evaluation, namely: texture as texture heterogeneity, humus reserve calculated on C/N basis and the useful soil bulk determined on the basis of impenetrable formations content for the roots called „nodules” in such way, the Romanian system of soil evaluation to reflect the actual status of fertility of these soils from the coal basin of Oltenia.

According with Romanian system of soil evaluation regarding texture heterogeneity there have been taken into account 6 distinct situation of calculus of the evaluation indicators for all 24 crops dividing the average textural classes to the thick and fine ones. There were, first, taken variable proportions of 75%/25%, 50%/50% and 25%/75% between size fractions related to 100% for the base textural classes (sandy, silty and clayey) and on the basis of average value there was calculated the evaluation marks in the first 50 cm of the soil profile (RAUTA, 1980, UTE, 1995).

**RESULTS AND DISCUSSIONS**

The present paper will presents only one of the 6 situation because of lack of space, namely: the evaluation of the anthropic soils with heterogenous texture (texture variation) and humus reserve calculated on the basis of C/N ratio within 25%-50% group at Valea Manastirii sterile dump (MARIN, 1974).

For the calculus of the texture variation there were used variable proportions of 25%/75% between sands and silty clay related to 100%for the base textural class (sands and silts) on the basis of the average values there were calculated the evaluation marks in the first 50 cm for the main crops as follows:

Table 1

Table title Evaluation marks for texture variation N/AI in the first 50 cm

Indicator 23A	%	GR	OR	PB	FS	CT	SF	SO	MF
N/AI	25/75	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

The analysis of humus content in the condition of variable texture (thick/middle) with 25%/75% ratio, C/N = 32 show a value of 1.83% organic matter and thick texture of 25%, calculus of the real hunus content is made related to the humus content of the group with C/N ratio between 8-15% applying the correction coefficients as follows: 1.83% x 30.7% (coefficient)=0.562% humus (corresponding with 8-15% C/N ratio). The humus reserve = 0.562% x 50 = 33.72 t/ha.

The evaluation coefficients for the humus reserve of Romanian system of soil evaluation (indicator 144) determined for the humus reserve class between 31-60 t/ha (33.72 t/ha in our case, with homogenous thick texture) will be corrected for including into the class of real humus content in function of the rates of estimated textural percentage of 25%.

Table 2

The intermediary evaluation coefficients for humus reserve

a. soils with thick texture 25%								
Indicator 144	GR	OR	PB	FS	CT	SF	SO	MF
045	0.20	0.20	0.20	0.20	0.18	0.18	0.20	0.20
b. soils with middle and fine texture								
045	0.45	0.45	0.37	0.37	0.37	0.30	0.37	0.45

The evaluation coefficients for the humus reserve proposed for the present case have resulted from adding intermediary coefficients for 8 crops that are different in comparison with the ones determined for homogenous texture.

Table 3

The final corrected evaluation coefficients for humus reserve c. soils with heterogenous texture: 25% thick(G)/75% middle(M)

Indicator 144	GR	OR	PB	FS	CT	SF	SO	MF
N/Al	0.7	0.7	0.6	0.6	0.6	0.5	0.6	0.7

On the basis of calculated evaluation coefficients after upward model „File of calculus of the evaluation marks” for the spolic entiantrosoil from Valea Manastirii sterile dump, District Gorj will look as follows:

Table 4

Calculus model for the evaluation marks

Eco pedological indicator	GR	OR	PB	FS	CT	SF	SO	MF
Tm	1	1	1	1	0.9	1	1	1
Pm	1	1	1	1	1	1	0.9	1
Gz	1	1	1	1	1	1	1	1
Pz	1	1	1	1	1	1	1	1
Sa	1	1	1	1	1	1	1	1
Tex (Tv)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Pol	1	1	0.9	0.9	0.9	0.9	1	0.9
I%	1	1	1	1	1	1	1	1
Al	1	1	1	1	1	1	1	1
Ap.f.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Inund.	1	1	1	1	1	1	1	1
Porosity	1	1	1	1	1	1	1	1
Lime	1	1	1	1	1	1	1	1
pH	1	1	1	1	0.9	1	1	1
Bulk	1	1	1	1	1	1	1	1
Reserve(C/N)	0.7	0.7	0.6	0.6	0.6	0.5	0.6	0.7
Exc.	1	1	1	1	1	1	1	1
Ev. mark	44	44	34	34	28	28	34	44
Fav. class	VI	VI	VII	VII	VIII	VIII	VII	VI
Av. evaluation mark				36				
Quality class				IV				
Kg/ev marks	60	60	80	30	450	500	-	-
Yielding capacity	2,640	2,640	2,720	1,020	12,600	14,000		

### CONCLUSIONS

- According to „Romanian system of soil evaluation” typical soils near anthropic soils from Oltenia coal basin have the following features:

- I st class with the evaluation mark of 82 – typical eutricambosoil;
- III rd class with the evaluation mark of 45 – stagnic luvisoil;

After the same system the anthropic soil from sterile dumps would be given 73 mark that is much higher than the real situation. With the variant proposed by us there were obtained evaluation marks and quality classes for anthropic soils are correlated to its real yielding potential as follows:

- IInd with an evaluation mark of 63 points for the spolic entiantrosoil with homogenous texture and humus reserve calculated on the basis of C/N ratio;

- III rd class with an evaluation of 43 points for the spolic entiantrosoil with homogenous texture, modified useful root bulk and the humus reserve calculated after C/N;
- IV th class with an evaluation mark of 36 points for the spolic entiantrosoil with heterogenous texture and the humus reserve calculated after C/N;
- IV th class with an evaluation mark of 24 points for the spolic entiantrosoil with heterogenous texture, modified useful root bulk and the humus reserve calculated after C/N;

#### **BIBLIOGRAPHY**

1. CORIGOIU VIOLETA, 2005. Limitative factors of the yielding capacity of soils from Gorj District(romanian). PhD thesis, USAMV Bucharest.
2. FODOR D., 1980. Open cut mining(romanian). Didactical and pedagogical editure Bucharest.
3. MARIN N., 1974. Researches on agrochemical features and productivity of main geological strata from Rovinari – Gorj quarry(romanian). PhD thesis, USAMV Iasi.
4. RAUTA C., CARSTEA ST., 1983. Romanian System of Soil Monitoring from Romania(romanian). ICPA Annals, vol. XIV Bucharest.
5. TEACID., 1980. Agricultural lands evaluation(romanian). Ceres Editure, Bucharest.
6. UTE BALLE, 1995. East german post lignite landscapes. Mining Environmental Management, March.