NEW ASPECTS REGARDING THE ENZYMATIC ACTIVITY OF THE TRANSYLVANIAN ENTIANTROSOILS (ROMANIA)

NOI ASPECTE PRIVIND ACTIVITATEA ENZIMATICĂ A ENTIANTROSOLURILOR DIN TRANSILVANIA (ROMÂNIA)

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Abstract: *Through surface excavation of coal at mining excavation Sărmăşag, Sălaj County, is mainly degraded, eutricambosoil molic and through the levelling the dumps is formed the typical entiantrosoil. As further investigation regarding the enzymatic activity of entiantrosoils from Transylvania, this paper presents the enzymatic activity of entiantrosoils which results from mining excavation Mirsid, Sălaj County. To fulfil the aim proposed soil samples have been taken from two profiles on three depths 0-20 cm, 40-60 cm, and 80-100 cm which have been according to the extent laboratory methodology for laboratories of soil biology. The results show that the enzymatic activity to these three depths is very low in comparison with the enzymatic activity of areas degraded soil (molic eutricambosoil). The values of dehydrogenase vary between 0.20 and 0.80 limits, the values of catalase vary between 10 and 85 and the saccharose values vary between 0.15 and 0.35. We have to mention that we cannot make any kind of correlation between these values and the soil sample depths. This thing can be explain through the heterogeneity of the dump material. Without a selective uncovering, the vegetable layer frequently reaches in the depth.*

Rezumat: *Prin exploatarea la suprafaţă a cărbunelui la exploatarea minieră Sărmăşag (jud. Sălaj) este degradat în principal, euricambosol molic şi prin nivelarea haldelor se formează entiantrosolul tipic. Continuând cercetările privind activitatea enzimatică din entiantrosolurile din Transilvania. Această lucrare prezintă activitatea enzimatică a entiantrosolului rezultat la exploatarea minieră Mirsid (jud. Sălaj). Pentru realizarea scopului propus s-au recoltat probe de sol din 2 profile pe trei adâncimi 0-20 cm, 40-60 cm şi 80-100 cm care au fost analizate după metodele folosite curent în laboratoarele de biologie a solului. Analizând rezultatele obţinute se poate constata că activitatea enzimatică la cele trei profile este foarte scăzută faţă de a solului zonal degradat (eutricambosol molic). Valorile dehidrogenazei variază în limitele a 0,20 şi 0,80, valorile catalazei variază între 10 şi 85, iar a zaharozei între 0,15 şi 0,35. De menţionat faptul că nu se poate face nici un fel de corelaţie între aceste valori şi adâncimea de recoltare. Acest lucru se explică prin heterogenitatea materialului de haldă. Fără o decopertare selectivă, stratul vegetal, frecven ajunge în adâncime.*

Key words: *enzymatic activity, entiantrosoils*
Cuvinte cheie: *activitatea enzimatica, entiantrosoluri*

INTRODUCTION

Continuing the researches made by the Soil Science Department from The University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca (4, 5, 7, 1, 2) this paper's aim to present the enzymatic activity (dehydrogenase, catalasic, and sugar based activities) from the degraded soils and Entriantrosoils (Antropical Regosoil WRB for SR 1998) resulted from the surface mine exploitation from Sărmăşag, Sălaj County.

MATERIAL AND METHOD

To accomplish the established target samples were taken for analysis, on genetically horizons and the dump material levelled so that this would permit the extraction from the depths of: 0-20 cm, 20-40 cm, and 80-100 cm.

The "soil" samples were analyzed after the methods currently used in the soil science laboratories (3) and microbiology (6, 8, and 9).

Due to the fact that the actual technology of coal exploitation, does not suppose a selective removal of the covering stratum of the coal deposits, in the entiantrosoil we had to dig four "soil" profiles

RESULTS AND DISCUSSIONS

According to the physic-geographical conditions (absolute altitude 450m, plain terrain, or slow slopes with a sliding of 5-7 %, the specifically forest vegetation, the moderate wet climate, varied lithological substrate: clay, shale and clay shale) the main soil cover is represented by Eutricambosoil (Eutric cambisoil) in different stadium of stagnogleization.

The sterile dumps are constituted by Entiantrosoil (Antropical Regosoil WRB for SR – 1998) without a succession of genetic horizons, and without a characteristic morphology, with a great heterogeneity of the physical and chemical proprieties.

Comparative analysis of enzymatic activities from soils and Entiantrosoil (table 1 and 2) show that, through the actual coal technology at Sărmăşag without a selective removal of the soil cover, the enzymatic activity is much reduced to Entiantrosoil (Antropical Regosoil WRB for SR 1998)

Table 1

Some chemical proprieties and enzymatic activity of the soil

	Horizon	Depth	pH H_2O	Humus %	Total N %	Enzymatic activity		
						Dehydrogenate (mg formazan)	Catalatic (mg H_2O_2) disintegrated	Sugar based activity (% reductive sugar)
Molic Eutricambosoil	Am	0-20	6.76	4.80	0.278	8.45	398	1.82
	A/BBv_1	35-55	7.31	2.80	0.175	6.92	194	0.20
	Bv_2	80-100	7.51	1.36	0.129	0.85	30	0.09
		140-160	6.76	1.58	0.103	0.42	20	0.09
Stagnic Eutricambosoil	Am	0-20	7.81	3.31	0.208	6.25	298	0.76
	A/B_w	25-45	7.79	3.25	0.160	2.82	180	0.31
	Bvw_1	55-75	7.88	0.99	0.074	0.85	25	0.09
	Bvw_2	90-110	7.90	0.93	0.079	0.67	15	0.06

The dehydrogenetic activity has high values in soils and especially in the horizons of bioaccumulation (8.45 at the molic eutricambosoil) and it is very low at entiantrosoil at all depths where the samples were taken (0.85-0.20).

The catalactic activity, characteristic of aerobic organisms, has low values at eutricambosoil, exception being the A molic horizon and very low at entiantrosoil, especially at the deep samples (80-100cm).

The sugar based activity varies very much from depth to depth, both for eutricambosoil and entiantrosoil, but is very well correlated with the content of humus and total N. The highest values were at entriantrosoils in the Am horizon (1.82% reductive sugar) and to the depth of 0-20cm at entiantrosoil.

Table 2

Some chemical proprieties and enzymatic activity of the soil
(Antropical Regosoil WRB for SR 1998)

Nr. profile	Depth	pH H_2O	Humus %	Total N %	Enzymatic activity		
					Dehydrogenate (mg formazan)	Catalatic (mg H_2O_2) disintegrated	Sugar based activity (% reductive sugar)
I	0-20	7.55	1.33	0.094	0.64	35	0.35
	20-40	7.80	0.35	0.004	0.23	15	0.15
	80-100	7.85	0.45	0.06	0.20	10	0.10
II	0-20	7.70	0.55	0.020	0.85	25	0.34
	20-40	8.00	0.80	0.030	0.75	18	0.16
	80-100	8.10	0.30	0.015	0.60	10	0.10
III	0-20	7.90	0.95	0.040	0.63	34	0.35
	20-40	7.95	0.60	0.010	0.33	15	0.18
	80-100	7.85	0.20	0.009	0.20	10	0.15
IV	0-20	8.50	1.35	0.100	0.60	35	0.35
	20-40	8.55	0.90	0.050	0.75	17	0.10
	80-100	8.95	1.08	0.105	0.25	12	0.10

CONCLUSIONS

The enzymatic activity (dehydrogenate, catalactic and Sugar based activity) of the studied soils is being found in the normal spectrum of values of these enzymes, but at entiantrosoil these values are extremely low.

This proves one more time, that through surface mine exploitations, without selective taking off of the vegetal stratum, and high perturbance in the biological activities are occurred.

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