

## THE USING OF THE COMPOSTS IN THE ECOLOGICAL BUILD-UP OF THE STERILE DUMPS FROM HUSNICIOARA QUARRY

### UTILIZAREA COMPOSTURILOR IN RECONSTRUCȚIA ECOLOGICA A HALDELOR DE STERIL DIN CARIERA HUSNICIOARA

R. MOCANU, Ana Maria DODOCIOIU, N. OSICEANU

University of Craiova

Corresponding author: Romulus Mocanu, e-mail:mocanuromulus@yahoo.com

**Abstract:** The psamic entiatrosoil from the Husnicioara quarry, District Mehedinți that resulted from the surface extraction of the lignite has unfavourable physical and chemical features: sandy – loamy texture, light alkaline reaction, low humus content, 0.2 – 0.4 %, low supplied with phosphorus (4.5 – 29.1 ppm) low and moderate supplied with soluble potash (36.5 – 61.4 ppm), being grouped in the fifth class of favourability. This is the reason why the main goal of increasing its fertility degree is to enlarge the organic matter content.

**Rezumat:** Entiantrosolul psamic din cariera Husnicioara județul Mehedinți, care a rezultat din exploatarea lignitului la suprafață, are însușiri fizico chimice defavorabile creșterii și dezvoltării plantelor.

**Key words:** compost, fertilizers, yield, sterile dumps

**Cuvinte cheie:** compost, ingrasaminte, producție, halde de steril

#### INTRODUCTION

An important aspect of the degrading process of the ecological equilibrium is the soil pollution, one of the pollution forms being the surface mining. Worldwide, the surface mining supply 100% of the building materials, 40 % of the coal production, 90% of the iron ore, 50% of other metal ore and 85% of other raw materials (Fodor, 1996).

The extracting technology of the lignite consists in a continuous excavation process, the transport of the material by running belt and the chaotic dumping of the sterile material in sterile dumps.

Taking account that the natural recovery of the affected terrains is slower than their degradation it is need to set up special measures for their more rapid ecological build-up even though the price of these operations is high (Dumitru, 2000).

Due to the fact that the main goal of this recovery is the increasing of the soil organic matter, the using of the composts plays an important role. This is the reason why we have tried some compost quantities in order to improve the fertility of these soils.

#### MATERIAL AND METHOD

The experiment was located on the psamic entiantrosoil from Husnicioara quarry and its goal was to make an ecological recovery of these lands by using compost with the sunflower in the 2000 – 2004 period.

The A factor: the compost dose with 4 graduations

a<sub>1</sub> – no compost

a<sub>2</sub> – 10 t/ha cattle compost

a<sub>3</sub> – 20 t/ha cattle compost

a<sub>4</sub> – 30 t/ha cattle compost

The B factor: the timing of compost applying with 3 graduations:

b<sub>1</sub> – annually

b<sub>2</sub> – every two years

b<sub>3</sub> – every three years

The C factor: chemical fertilizers with three graduations:

c<sub>1</sub> – N<sub>0</sub>P<sub>0</sub>

c<sub>2</sub> – N<sub>40</sub>P<sub>60</sub>

c<sub>3</sub> – N<sub>80</sub>P<sub>60</sub>

The compost had the following chemical composition: 1.054% N, 0.447% P<sub>2</sub>O<sub>5</sub>, 0.095% K<sub>2</sub>O, 0.993% CaO, and 0.151% MgO. The sunflower crop kind was Performer, the drilling was done at 70 cm row distance. The psamic entantrosoil where the experiment was located has not genetically obvious horizons yet it is formed by several strata, S<sub>1</sub>, S<sub>2</sub>, ... S<sub>4</sub> with depths of 25 cm that have resulted as the sterile material was unselective deposited. These strata have a high content of thick sand, 45-70%, fine sand of 17.7-24.3% and low quantities of physical clay, 3.9-7.1% and colloidal clay 2.0-12.2%. These materials determine a sandy-silt texture.

## RESULTS AND DISCUSSION

The production of sunflower seeds kg/ha in average on the three years of trial in the conditions of the sterile dumps of Husnicioara was relatively high. Both the organic and chemical fertilizers have determined important yield outputs the yields being even higher that on the near by soils. The using of the compost in different doses has determined the increasing of the yield with up to 109 – 212 %. In this manner, the yields have increased from 619 kg/ha with the not fertilizer variant to 708 kg/ha with the using of 10 t/ha compost, to 1058 kg/ha with 20 t/ha compost and to 1167 with the applying of 30 t/ha compost.

The annual applying of the compost have determined the obtaining of 1085 kg/ha, the every two years applying gave 815 kg/ha and the applying every three years, 764 kg/ha. This fact makes evident the lack of the organic matter from this material (table 1).

The fertilizers, also, gave good results with the sunflower on the sterile dumps. Such way, with the unfertilized variant, the yield was of 792 kg/ha. After applying N<sub>40</sub>P<sub>60</sub>, the seed yield has increased to 867 kg/ha and with the N<sub>80</sub>P<sub>60</sub> dose it reaches 978 kg/ha.

Table 1

The sunflower yield after compost and fertilizer applying, in average on 3 years of trial (2002-2004)

Organic fert.	Average 2002-2004				Timing	Fertiliz				Fertiliz er Kg/ha	Fertiliz			
	Yield Kg/ha	Rel. value %	Diff.	Sign.		Yield Kg/ha	Rel. value %	Diff.	Sign.		Yield Kg/ha	Rel. value %	Diff.	Sign.
No comp.	619	100	0		Annual ly	1085	100	0		N <sub>0</sub> P <sub>0</sub>	792	100	0	
10t	708	114	+89		2 years	815	75	-270		N <sub>40</sub> P <sub>60</sub>	867	109	+75	X
20t	1058	171	+439	Xx	3 years	764	70	-321		N <sub>80</sub> P <sub>60</sub>	978	124	+187	Xx
30t	1167	188	+548	xxx										
		DL 5% = 201				469					74			
		DL 1% = 304				769					123			
		DL 0.1% = 486				1,404					231			

The mass of a thousand seeds was, also, directly influenced by the compost doses that were applied. In this manner, the applying of increasingly doses of compost have conducted to the increasing of the mass of a thousand grains from 61.3 g with the not fertilized variant till 62.2 g after applying 10 t/ha compost, to 62.7 g with 20 t/ha compost and to 63.0 g with the applying of 30 t/ha compost, in average on the three years of trials.

The using of the compost at different time intervals has conducted to the decreasing of the mass of one thousand grains from 63.3 g with the annual applying to 61.7 and 61.6 g once every two and, respectively, once every three years.

In function of the chemical fertilizer doses that were applied in average on the three years of trial, the mass of a thousand grains has decreased along with the applying of  $N_{40}P_{60}$ , from 63.0 g with the not fertilized variant to 62.5 g. By using a higher dose of chemical fertilizer, the mass of a thousand grains increases to 63.8 g. (table 2)

Table 2

The mass of a thousand grains in function of different organic and chemical fertilizers (in average on 2002-2004 period)

Organic fert.	Average 2002-2004				Timing					Fertilizer Kg/ha				
	MMB g	Rel. value %	Diff.	Sign.		MMMB g	Rel. value %	Diff.	Sign.		MMB g	Rel. value %	Diff.	Sign.
No comp.	61.3	100	0		Annually	63.3	100	0		$N_0P_0$	63.0	100	0	
10t	62.2	102	+0.9	x	2 years	61.7	97	-1.6	0	$N_{40}P_{60}$	62.5	104	+2.2	X
20t	62.7	102	+1.4	Xx	3 years	61.6	97	-1.7	0	$N_{80}P_{80}$	63.8	106	+3.5	Xx
30t	63.0	103	+1.7	xxx										

DL 5% = 0.6

1.5

0.6

DL 1% = 0.8

2.4

1.0

DL 0.1% = 1.4

4.6

1.9

## CONCLUSIONS

- The sterile dumps resulted from the surface mining of lignite at Husnicioara, District Mehedinti can be classified in the category of the psamic entantrosoil that have unfavourable agrochemical features for the plant growth as follows:
  - the soil texture is sandy-silt or silty-sandy
  - the soil reaction is weak to moderate alkaline
  - the humus content is extremely low, very scarce in nitrogen
  - the phosphorus and potash supplying degree is very low
- The main objective for the biological recovery of the sterile dumps is the enhancing of the organic matter content which can be achieved by cultivating pulses and applying organic fertilizers
- The applying of different cattle compost, 10, 20 and 30 t/ha with the sunflower crop has conducted to the increasing of the yield/hectare from 619 with the unfertilized variant to 708, 1088 and respectively 1167.
- By applying the chemical fertilizers in different doses the sunflower yield has increased along with the increasing of the dose,  $N_{40}P_{60}$  to  $N_{80}P_{60}$  from 792 to 867 kg/ha.
- The applying of the compost on the sterile dumps with the sunflower crop has conducted to the increasing of the fertility degree, pH decreasing and the increasing of the humus, phosphorus and potash content along with the increasing of the compost doses.

### **LITERATURE**

1. BLAGA GH., BUNESCU V., RAUTA C., DUMITRU M., -1981. Studiul proprietatilor fizice, chimice si biologice ale materialelor de halda nivelate in vederea recultivarii. Lucrarile CNSS Brasov.
2. CERNEA D. si colab. -2002. Studiul de evaluare al impactului ecologic produs de extractia lignitului in bazinele miniere ale Olteniei. ICSITPML –Craiova.
3. DAVIDESCU D., VELICICA DAVIDESCU -1999. Compendium agrochimic. Editura Academiei Romane Bucuresti.
4. DUMITRU M. si colab. -2002. Structura culturilor si sitemul de fertilizare a haldelor de steril. Lucrarile Simpozionului International Targu-Jiu, 7-8 iunie.