THE EFFECT OF SOME METHODS OF APPLICATION OF CHEMICAL FERTILIZERS AND INDUSTRIAL WASTES ON PRODUCTION OF MAIZE ON A CAMBIC CHERNOZEM IN TIMISOARA

EFECTUL UNOR METODE DE APLICARE A ÎNGRĂŞAMINTELOR CHIMICE ŞI AL UNOR REZIDUURI INDUSTRIALE ASUPRA PRODUCȚIEI DE PORUMB PE UN CERNOZIOM CAMBIC DE LA TIMIŞOARA

Cosmin DRAGOŞ, Ioan GAICA

Banat University of Agricultural Sciences and Veterinary Medicine Timisoara

Abstract: *This paper presents the results obtained in maize production by different methods of fertilization on a cambic chernozem, with a medium clay-loamy texture. The hybrid used is PR 36 R10. The largest maize production (10299kq/ha) was obtained in the variant fertilized with ash CET 5 t / ha.*

Rezumat: *Aceasta lucrare prezinta rezultatele obținute în producția de porumb prin diferite metode de fertilizare pe un cernoziomului cambic, cu o textură lut mediu-argilos. Hibridul folosit este PR 36 R10. Cea mai mare producție de porumb (10299kg/ha) a fost obținută în varianta fertilizate cu CET cenuşă 5 t / h*

Key words: *maize, fertilization, ash, mine tailings*
Cuvinte cheie: ***porumb, fertilizare, cenuşă, sterili miniere***

INTRODUCTION

Sterile and ash dumps have a negative environmental impact due to their storage on large areas of land, areas that are removed from agricultural. Romania was and is one of the major producers of ash in the world, because of burning low quality coal. For each ton of coal burned follows a quantity of 0.15 to 0.6 tons of ash.

MATERIAL AND METHODS

Based on the soil samples taken from field tests were made physical, chemical soil (pH, humus, total nitrogen, phosphorus and potassium), mineralogical, biological, micromorphology, etc..

Research has been conducted on a mold bill, phreatic wet, clay loamy / clay environment, with a pH between 0-48CM weak acid, neutral between 48-57 cm, slightly to moderately alkaline between 57-200cm. On the 9 variants were administered different doses of chemical fertilizers, ash and mine tailings CET by different methods (all over, one by one). Used Hybrid is PR 36 R10

RESULTS AND DISCUSSIONS

Interpretation of soil analysis results the following:

- Texture is clay-loamy average (TT) from 0-200cm;
- Total porosity has very high values between 0-13cm, low between13-28 cm, medium values between and 28-87;
- Field capacity (CC), have medium values between 0-87cm;
- The fading coefficient (CO) has high values between 0-87cm
- Apparent density (DA) have very low values between 0-13cm, high 13-28cm, medium between 28-87cm;

-pH between 0-48cm weakly acid, neutral between 48-57 cm, slightly, to moderately alkaline between 57-200cm

- The content of calcium carbonate CaCO3 is absent from 0-74cm, medium between 74-100cm high and between 100-148cm;
- Humus reserve in the top 50 cm has high values;
- Nitrogen index in Ap present high levels;
- Content of assailable P in Ap have a state of supply means;
- Content in assailable K in Ap (or 20 cm) have a good supply status;

Table 1

Soil profile

HORIZONS	**UM**	**Ap**	**Atp**	**Am**	**A\B**	**Bv**	**B\C**	**C\B**	**C**	**Cca**	**Cca 2**
Depth	cm	13	28	48	57	74	87	100	125	148	200
Coarse sand %	%	0,5	0,4	0,2	0,3	0,3	0,3	0,3	0,3	0,7	0,4
Fine sand%	%	31,4	32,6	30,8	32,8	32,8	31,5	38,3	38,3	32,1	34,9
Dust %	%	33,1	26,8	28,1	28,1	26,3	28,5	28,5	29,7	23,8	22,4
Colloidal clay	%	36,0	40,2	40,9	40,6	39,7	39,7	31,7	31,7	43,4	42,3
Physical clay	%	49,3	51,8	52,8	52,5	52,3	51,1	47,4	47,5	52,9	52,8
TEXTURE		TT	TT	TT	TT	TT	TT	TT	TT	TT	TT
specific density	g/cm^3	2,69	2,73	275	2,75	2,75					
apparent density	g/cm^3	1,02	1,58	1,35	1,43	1,39	1,34				
Total porosity	%	62,08	43,22	50,90	48,00	4,21	51,27				
Degree of compaction	%	-0,22	9,06	1,49	7,01	0,39	0,38				
Hygroscopicity coefficient	%	10,43	9,41	9,58	9,51	9,43	9,30				
Fading coefficient	%	12,65	14,12	14,37	14,26	14,08	13,95				
Field capacity	%	23,45	23,72	23,76	23,74	23,71	23,68				
Total capacity	%	60,86	26,66	37,70	33,57	38,24	38,26				
Usable water capacity	%	10,80	9,60	9,42	9,48	9,62	9,73				
pH		6,65	6,76	6,72	6,99	7,51	7,53	7,78	8,10	8,28	6,30
$CaCO_3$	%	0	0	0	0	0	4,60	5,30	13,10	16,70	8,10
Humus	%	3,40	3,23	2,30	1,70						
Nitrogen index		2,25	1,96	1,95							
Humus reserve	to/ha	32,8	80,29	49,68	162,77						
P mobile	ppm	32,6	30,1	27,5	30,1	35,5	36,8	29,6	28,1	28,1	28,1
K mobile	ppm	215	240	215	225	218	238	221	203	203	203
Base exchange	me/100	25,19	26,66	23,90							
Replaceable H	me/100	15,10	14,30	15,80							
Degr. of sat. in base	%	83,96	84,82	85,14							

Table 2

Chemical characteristics of tailings used in experience

Sample	Location		pH în H_2O	total % N	Humus %	P (AL) ppm	K (AL) ppm
1	Landfill Doman	slope	7,15	0,301	6,10	7,6	100
2		plateau	7,40	0,301	6,10	6,9	113

Total nitrogen content (and organic carbon) is used to calculate an index pedogenetic important, report C: N (obtained by dividing the number of gram atoms of C to the number of atoms in 100 g of N g soil) which indirectly give information on the nature of soil humus, the conditions in which the accumulation of organic matter in soil it is realized.

Sterile contains particles of coal that oxidizes and gives very high values of organic carbon, carbon that is outside the constitution of humus, respectively the organic matter in waste dumps. So not all the carbon in the landfills are located as humic acids, it is found also as particles of coal.

Table 3

Analytical data of samples from the ash dumps CET (OSPA Timişoara)

Depth (cm)	0-20	20-40
Coarse sand %	14,16-37,5	10,8-37,6
Fine sand%	51-64,4	50-73
Dust %	4,3-13,6	4,4-8,9
Clay%	7,2-7,9	7,3-8
pH H_2O	7,87-7,91	7,75-7,9
$CaCO_3$%	1,15-2	0,74-2
Humus%	3,5-4,49	3,73-4,41
N total%	0,4-0,46	0,4-0,45
Mobile P%	0,2	0,14
Mobile K %	0,05	0,04
Mobile P ppm	0,05-36,3	0,05-47,3
Mobile K ppm	0,19-270	0,16-280
Soluble saltsmg/100	116,7-278,5	103,4-190,9
Cobalt	38-42,5	25-42,5
Copper	70-92	57,5-77,25
Manganese	510-825	465-700
Zinc	80-225	80-225
Cadmium	<1.5	<1.5
Nickel	40-50	40-50
Lead	55-101	75-103
Magnesium	3700-6250	3700-6250
Iron	34550-35000	35000-35050

Results of ash analysis warns over the concentration of lead, but also on the critical concentration of cobalt, copper, cadmium, nickel and zinc.

Table 4

Yields results

Variant	Plants Nr	Cobs Nr.	Cobs weight	5 cobs weight	grains Wth. 5 cobs	Rand. %	Prod.kg. Cob./ha	Prod. kg Gr./ha	increase yields
Min. Fert over the whole surface	82	67	17.2	1.290	1.112	86.20	11169	9627	106%
Min Fert on row	91	89	17.8	1.300	1.116	85.84	11558	9921	109%
Organic fertilization	85	88	17.0	1.215	1.064	87.57	11038.9	9665	107%
Witness	85	85	16.0	1.334	1.159	86.88	10.389	9025	-
CETash 5 t/ha	92	92	17.5	1.304	1.182	90.64	11363.6	10299	114
CET ahs10t/ha	73	73	17.8	1.400	1.103	78.78	11558	9105	101
CET ash 5t/ha+NPK	79	79	18.2	1.440	1.213	84.23	11818	9954	110
Witness	76	75	10.5	0.898	0.755	85.63	6818	5838.2	-
Mining Sterile 2,5 t/ha	94	83	11.5	0.984	0.827	88.35	7467	6597	113
Mining Sterile 5 t/ha	82	83	11	0.936	0.826	88.24	7142	6302	107
Mining Sterile2,5t/ha + NPK	93	89	16.0	1.052	0.992	87.64	10389	9104	155

Compared to the control (5838.2), if fertilization with ash from thermal plants have higher yields obtained with 13% for mine tailings fertilization with 2.5 t / ha, 7% for fertilization with 5 t / ha and 55% when chemical fertilizers were applied along the 2.5 t / ha.

If fertilization with ash from thermoelectric plant, the production increases are between 1-14% the more significant increase was obtain if 5t/ha ash was applied as fertilization.

CONCLUSIONS

A method of re-entry in the circuit, the residue obtained after termoelectric power plants activity and mining operation, is the administration on the agricultural fields mixed with organic materials or fertilizers chemical.

There was an increase in maize production in combination, NPK with ash CET (13%) and mine tailings (7%), so these interactions brought increase production.

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