

## EXPERIMENTAL STUDIES ON THE FERTILITY OF THE EUTRIC PSAMOSOIL IN POIANA MARE – DOLJ

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### INTRODUCTION

The sands and sandy soils are very difficult to cultivate because of their special features. This way, because of their high content of thick size particles (over 85-90%) these lands are light as regard tillage, even during raining periods which is a positive feature. All other features are negative as regard plant development. These soils have a low colloidal complex, the compactity and adhesivity of these soils are very low and that is why they do not keep water and nutrients, for increasing their fertility there are needed irrigation and complex fertilization.

### MATERIAL AND METHOD

In order to evaluate the productive capacity of sandy soils from Poiana Mare and the way these soils respond to several methods of fertilization there was set up an experiment on an eutric sandy soil located on the top of a dune.

The experimental treatments were:

V<sub>1</sub>= not fertilized (Ctrl.);

V<sub>2</sub>= fertilized by N<sub>100</sub>;

V<sub>3</sub>= fertilized by N<sub>100</sub> P<sub>60</sub>;

V<sub>4</sub>= fertilized by N<sub>100</sub> P<sub>60</sub> K<sub>40</sub>;

V<sub>5</sub>= fertilized by manure, 30 t/ha, once every 3 years.

The experiment was kept three years in a biennial crop rotation, wheat – corn. The dune where the experiment was located is of average height and wider platform.

**Table 1.**

**The main physical and chemical features of eutric sandy soil from Poiana Mare, District Dolj**

Soil	Depth Cm	Sand 2- 0,2mm	Loam 0,02- 0,002mm	Clay v 0,002mm	HUMUS %	Nt %	P	K	pH (H <sub>2</sub> O)	SB me/mg sol
							Ppm			
EUTRIC SANDY SOIL	0- 20	83.7	6.1	10.2	1.58	0.079	30.0	101	7.9	9.8
	20- 40	86.1	5.2	8.7	0.91	0.046	14.6	96	8.1	11.5

The soil has a high content of sand (over 90%) and a low content of loam and clay (under 10%). The reaction is low alkaline. The humus content is low and the soil is weakly supplied by nutrients (table 1).

### **Results obtained from culture of maize production on eutric psamosoil**

Corn is the second cash crop, after wheat that is cropped by farmers from sandy soil area. Being a crop that requires water and taking account that the summer months are rather droughty, in rainfed conditions the yields are low and very low, and in latest years, on the top of dunes, they are compromised.

Analyzing the results obtained in the experiment with corn on the eutric sandy soil there can be observed that on the control variant (V<sub>1</sub>) that did not receive any fertilizer, the average yield has been of 1,215 kg/ha.



and an yield output of 103 kg/ha, so, much lower than the ones determined by nitrogen and phosphorus which conclude that potassium is less efficient on eutric sandy soil.

The manure amount applied has been of 30 t/ha once every three years (V5) and the yield was 2,653 kg/ha, higher than double of the control treatment (V1). The percentual output with this treatment has been of 118 % and the yield difference over the control variant (V1) has been of 1,438 kg/ha, very significant.

In conclusion, with the corn crop on the eutric sandy soil, the results have shown that on these low productive soils, by fertilization, there can be obtained increased yields. Calculating the yield output on one kg of active ingredient of fertilizer (table 3) there can be noticed that only with nitrogen fertilization the yield output was the lowest (2.98 kg corn/kg of nitrogen), this fact meaning that the nitrogen determines mostly a vegetative growth and less a productive one.

**Table no. 3.**  
**The specific yield output on eutric psamosoil in Poiana Mare-Dolj (kg corn / Kg active ingredient)**

Specification	Treatment			
	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>
Kg corn/Kg a.i.	-	2.98	4.05	4.26

The applying of concentrated superphosphate along with nitrogen determine an yield output of 4.05% kg corn/kg active ingredient and the adding of KCl the yield output reaches 4.26 kg corn/kg a.i. With the corn crop there is observed that the yield output with the V4 treatment has been slightly higher, when this fertilizer, KCl, has been added; this fact shows that the corn crop does capitalize better potassium fertilizer.

After interpreting the yield results after the system every to every (table 4) there can be noticed that, taking as control the V1 treatment, the yield difference over the V2 treatment that has been fertilized by ammonium nitrate (298 kg/ha) has been distinctively significant and the yield differences between V<sub>3</sub> (648 Kg/ha), V<sub>4</sub> (851 Kg/ha) and V<sub>5</sub> (1438 Kg/ha) have been very significant.

**Table 4**  
**Calculation of multiple comparisons on culture of maize on eutric psamosoil in the area Poiana Mare-Dolj**

Nr.	Yield (Kg/ha)	Treatment	1,513	1,863	2,066	2,653
1	2,653	V <sub>5</sub>	1438***	1140***	790***	587 ***
2	2,066	V <sub>4</sub>	851***	553***	203*	-
3	1,863	V <sub>3</sub>	648***	350**	-	-
4	1,513	V <sub>2</sub>	298**	-	-	-
5	1,215	V <sub>1</sub>	-	-	-	-

DL 5% = 174 Kg/ha

DL 1%=253 Kg/ha

DL 0,1% =380 Kg/ha

Taking as control the V2 treatment that has an yield of 1,513 kg/ha, the difference of yield over V3 (350 kg/ha) has been distinctively significant and the differences over V<sub>4</sub> (553 Kg/ha) and V<sub>5</sub> (1140 Kg/ha) have been very significant.

Taking as control the V3 treatment, that has an yield of 1,863 kg/ha, the yield difference over V4 (203 kg/ha) was significant and the difference of yield over the V5 (790 kg/ha) was very significant.

Taking as control the V4 treatment that has recorded an yield of 2,066 kg/ha, the yield difference over the V5 treatment (587 kg/ha) was distinctly significant.

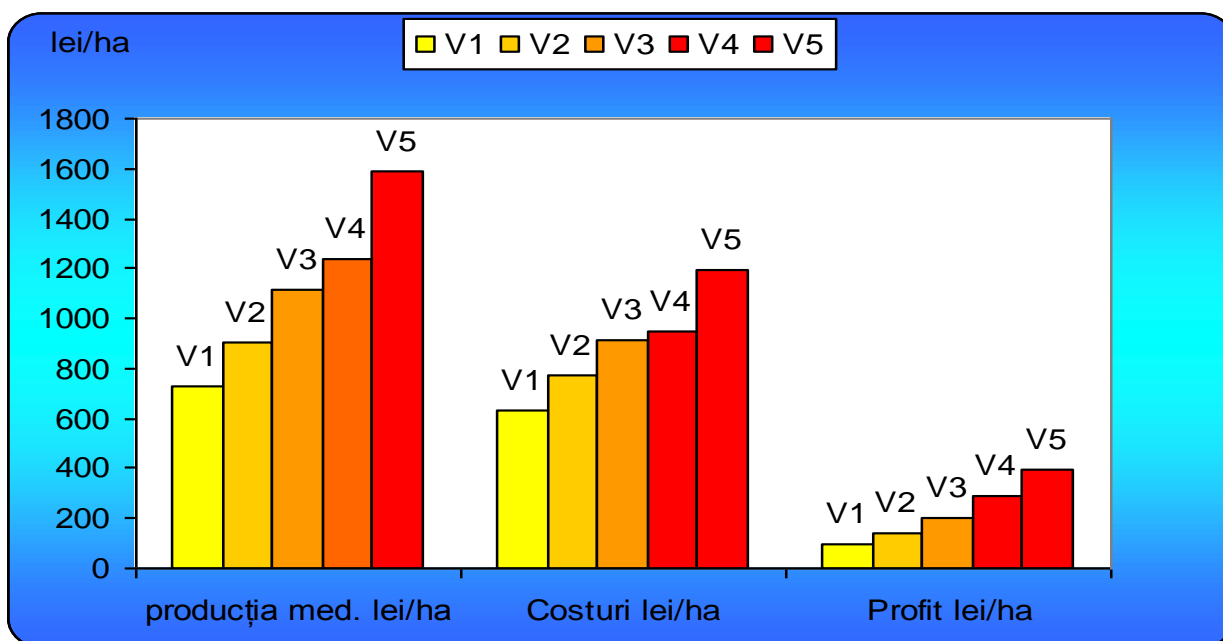
**The economic efficiency of maize culture on eutric psamosoil**

The corn yields have been slightly higher; therefore, the economical parameters had higher values, too. This way, on the eutric sandy soil, with the not fertilized treatment (V1), at a selling price of 600 lei/ton, the yield selling value has been of 729 lei/ha and the production cost was 631.8 lei/ha resulting a profit of 97.2 lei/ha with a profit rate of 15.4% (table 5, figure 2).

**Table no. 5.**

**The economic indicators obtained from maize culture on eutric psamosoil in the area Poiana Mare-Dolj (sale price 600 lei/t)**

Treatment	Average yield, lei/ha	Cost, lei/ha	Profit, lei/ha	Profit rate, %
V <sub>1</sub> = not fertilized, ctrl.	729	631.8	97.2	15.4
V <sub>2</sub> = N <sub>100</sub>	907.8	771.63	136.17	17.6
V <sub>3</sub> = N <sub>100</sub> P <sub>60</sub>	1117.8	912.87	204.93	22.4
V <sub>4</sub> = N <sub>100</sub> P <sub>60</sub> K <sub>40</sub>	1239.6	950.36	289.24	30.4
V <sub>5</sub> = manure 30 t/ha	1591.8	1193.85	397.95	33.3



**Figure no. 2. The economic indicators obtained from maize culture on eutric psamosoil in the area Poiana Mare-Dolj**

By fertilizing with N100 (V2), the value of the yield has been of 907.8 lei/ha and the cost of production of 771.3 lei/ha which determined a profit of 136.17 lei/ha, with a profit rate of 17.6%.

When phosphorus was added as fertilizer, along nitrogen, N100P60 (V3), the value of the yield has been of 1117.8 lei/ha and cost of production was 912.87 lei/ha. By difference has been obtained a profit of 204.93 lei/ha and a profit rate of 22.4%.

When complete mineral fertilization has been applied, N100P60K40 (V4), the value of the yield reached 1,239.6 lei/ha and the production cost was 950.36 lei/ha. The profit obtained with this treatment has been of 289.24 lei/ha with a profit rate of 30.4%.

With the V5 treatment, when manure was added to complete mineral fertilization there were obtained the best economical results, with a profit of 397.95 lei/ha and a profit rate of 33.3%.

### CONCLUSIONS

After economic analysis of the production results there can be observed that the experiments performed on sandy eutric soil from Poiana Mare emphasize the fact that these soils are low productive. In order for this soil to be efficient there is need of complex works of reclamation as organic and mineral fertilization as well as irrigation.

### BIBLIOGRAPHY

1. **Canarache, A.**, 1990 - Fizica Solurilor Agricole, Editura Ceres București.
2. **Filipov F.**, 2005 - Pedologie. Ed. „Ion Ionescu de la Brad”, Iași.
3. **Mihalache M., Ilie L.**, 2008 - Pedologie-Solurile României. Ed. Domino, București.
4. **Obrejanu, Gr. și colab.**, 1972 - Valorificarea nisipurilor și solurilor nisipoase din România. Editura Ceres, București.
5. **Paulette Laura**, 2007 - Pedologie, studiul solului în teren și laborator. Ed. Todesco, Cluj-Napoca.
6. **Vasile, D., Popescu C., Grecu F.**, 2008 - Curs de Pedologie, Editura Universitaria Craiova.