RESEARCH REGARDING THE INFLUENCE OF ROTATION AND FERTILIZATION TO THE YIELD AND HER QUALITY ON MAIZE CULTIVATED ON IRRIGATED SANDY SOIL FROM SOUTH-WEST OF OLTENIA

CERCETĂRI PRIVIND INFLUENȚA ASOLAMENTULUI ŞI A FERTILIZĂRII ASUPRA PRODUCȚIEI ŞI CALITĂȚII ACESTEIA LA PORUMBUL CULTIVAT PE PSAMOSOLUL IRIGAT DIN SUD-VESTUL OLTENIEI

Gh. MATEI, D. GHEORGHE, Elena ROŞCULETE, F. IMBREA, Ileana COJOCARU

University of Craiova, Facultaty of Agriculture
19 Libertăți street, Craiova, Dolj, matei.gheorghe@gmail.com

Abstract: *In our country, the problem of the structure crops has an important place, since the proportion of large grains which required by the national economy and the decreased number of agricultural species grown since 1990 at the country level. This requires systemic thinking and a complex view from the experts and practitioners, as regards the rational crop rotation respecting the principles of modern and efficient agriculture. Regarding maize, the data obtained in 9 years of testing shows that have a better behavior in monoculture than wheat. BORCEAN I., (1992) show that in the extended monoculture of corn reduces humus content, the structure degrades, a progressive acidification of the soil, the soil is exhausted in the macro and micro elements recommending the use of rotation for 4-6 years. Results from the world shows that fertilization contributes 30-50% to increase yields per unit area, the most cultivated plants and products from various countries of the world are closely correlated with the types and doses of fertilizers used.*

Rezumat: *În ţara noastră, problema structurii culturilor ocupă un loc important, dat fiind proporţia mare de cereale pe care le solicită economia naţională şi totodată diminuarea numărului de specii agricole cultivate după 1990 la nivelul ţării. Aceasta presupune o gândire sistemică şi complexă, din partea specialiştilor şi practicienilor, în ceea ce priveşte organizarea asolamentelor raţionale, respectând principiile unei agriculturi moderne şi eficiente. În ce priveşte porumbul, datele obţinute în 9 ani de experimentare demonstrează că acesta se autosuportă mai bine decât grâul. BORCEAN I., (1992) evidenţiază faptul că în condiţiile monoculturii de porumb prelungite se reduce conţinutul de humus, se degradează structura, are loc o acidifiere progresivă a solului, se epuizează solul în macro şi microelemente recomandând utilizarea unor asolamente de 4-6 ani.Rezultatele obţinute pe plan mondial demonstrează că fertilizarea contribuie cu 30-50% la creşterea recoltelor pe unitatea de suprafaţă, la majoritatea plantelor cultivate, iar producţiile obţinute în diverse ţări ale lumi sunt strâns corelate cu tipurile şi dozele de îngrăşăminte folosite.*

Key words*: maize, fertilization, yields.*
Cuvinte cheie*: porumb, fertilizare, producţie;*

INTRODUCTION

Intervening directly in agricultural production, the man directly influences the soil fertility. Each measurement technique applied to the soil as acting separately and in interaction, leading to an evolutionary process longer or shorter.

From these, rotation and fertilizers strong influence fertility, their characteristics that distinguish them essential. Thus, the rotation has a slow action, which occurs with time,

influencing the structure and fertility by switching crops. The action is biological, which synthesized, is the amount of scrap left in organic soil, root secretions, biological processes of decomposition and synthesis of quantitative and qualitative accumulation occurring in soil (ONISIM T. et al., 1992).

MATERIAL AND METHOD OF RESEARCH

The research was made at Development Research Center for Plants Culture on Sandy Soils Dăbuleni (CCDCPN Dăbuleni) during the 2006 – 2008 years.

In the experience entitled "Research on the effect of rotation and fertilization on production of wheat and maize on sandy soils" the studied factors are:

A Factor- crop rotation

a1 – 3 years rotation (wheat- maize-soya);

a2 – 4 years rotation (wheat-alfalfa-maize-soya);

a3 – wheat monoculture;

a4 – maize monoculture;

a5 – 2 years rotation (maize-wheat);

a6 – 5 years rotation (wheat-alfalfa-potato-maize-wheat);

a7 – 3 years rotation (wheat- maize-groundnuts);

a8 – 6 years rotation (maize-groundnuts-wheat-sunflower-potato-wheat);

a9 – 4 years rotation (bean-wheat-maize-wheat).

B Factor – fertilization

b1- $N_0P_;$

b2- $N_{160}P_{80}$;

b3- $N_{80}P_{80}$

As a witness we use the unfertilized variant on each rotation. The experimented hybrid was Olt sowing in irrigated conditions on 60,000 seeds/hectare.

RESULTS AND DISCUSSIONS

The climate conditions on the experimented period were different as favorability for maize crop. Analyzing the average air temperatures recorded in the period October 2006 - September 2008 compared with multi-annual values, there are high fluctuations of values (figure 1).

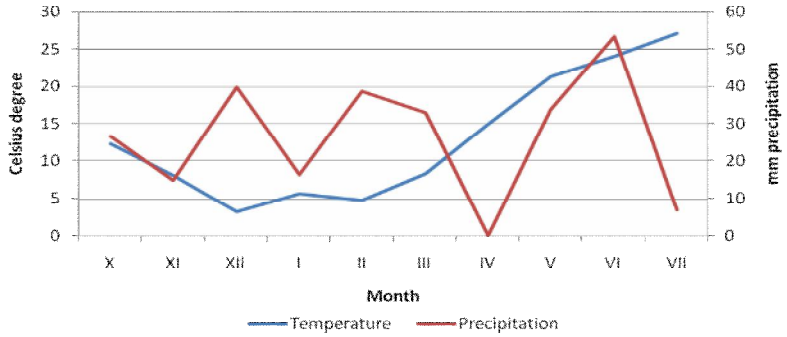

Figure 1 – The climate conditions on 2006-2008 yers

During the 2006-2008 the rainfall has been less quantitative, contributing to a substantial reduction in soil moisture, which resulted, correlated with high temperatures, an excessively strong drought, with negative repercussions on growth and development of maize plants.

The rain falls in this interval were favorable only in the first stage of plant development, then the needed water has provided by the irrigation.

In table no. 1 we present the influence of the crop rotation and fertilization to the values of the obtained yields.

Table 1

The influence of the crop rotation and fertilization to the corn yields

Rotation	*Fertilization*	*Yields q/ha*				*Differences q/ha*	*Signification*
		2006	*2007*	*2008*	*Media*		
Monoculture (maize)	N_0P_0	6.2	4.4	3.0	4.5	-	-
	$N_{80}P_{80}$	8.7	11.4	11.6	10.6	6.1	-
	$N_{160}P_{80}$	9.2	11.7	11.1	10.7	6.2	-
2 years (wheat)	N_0P_0	8.7	4.9	5.3	6.3	1.8	-
	$N_{80}P_{80}$	16.5	11.3	22.1	16.6	12.1	**
	$N_{160}P_{80}$	13.7	12.0	22.2	16.0	11.5	**
3 years (soya)	N_0P_0	11.2	5.8	7.5	8.2	3.7	-
	$N_{80}P_{80}$	16.5	12.5	26.4	18.5	14.0	***
	$N_{160}P_{80}$	14.4	13.2	28.2	18.6	14.1	***
3 years (groundnuts)	N_0P_0	10.3	9.4	11.0	10.2	5.7	-
	$N_{80}P_{80}$	17.4	16.7	30.9	21.7	17.2	***
	$N_{160}P_{80}$	16.2	16.2	35.7	22.7	18.2	***
4 years (soya)	N_0P_0	10.6	6.3	12.5	9.8	5.3	-
	$N_{80}P_{80}$	18.9	12.9	30.3	20.7	16.2	***
	$N_{160}P_{80}$	16.5	13.4	29.2	19.7	15.2	***
4 years (bean)	N_0P_0	12.7	10.4	17.4	13.5	9.0	*
	$N_{80}P_{80}$	15.6	17.7	36.8	23.4	18.9	***
	$N_{160}P_{80}$	16.5	16.5	36.1	23.0	18.5	***
5 years	N_0P_0	10.6	7.6	11.0	9.7	5.2	-
	$N_{80}P_{80}$	14.6	17.3	31.7	21.2	16.7	***
	$N_{160}P_{80}$	15.9	14.2	32.1	20.7	16.2	***
6 years	N_0P_0	11.9	10.9	17.1	13.3	8.8	*
	$N_{80}P_{80}$	14.4	17.0	37.1	22.8	18.3	***
	$N_{160}P_{80}$	17.4	18.7	38.5	24.9	20.4	***
DL 5% =		3.9	3.5	14.3	7.2	q/ha	
DL 1% =		5.2	4.7	19.1	9.7	q/ha	
DL0.1%=		6.8	6.2	24.9	12.6	q/ha	

As it can be observed from the yields values on the experimented years the highest productions were obtained in 2008, a year considered as favorable for corn crop in the area of sandy soils from South-West of Oltenia.

In average on 2006-2008 years the yields varied between 4,5 q/ha at the unfertilized variant in monoculture and 24,9 q/ha at the 6 years rotation on $N_{160}P_{80}$ variant.

On maize crops, the combined influence of factors taken into study resulted in obtaining increases of productions in all rotation and all agro founds compared with monocultures at unfertilized variant.

Is noteworthy that increases crop monocultures due to fertilization in maize were low and statistically not statistically insured, which shows that the effectiveness of mineral fertilizers in monocultures is low. In rotation 2 years of wheat-maize increases due to

fertilization are distinct and significant values of 11,5-12,1 q / ha and in rotations of 3-6 years are very significant and have values of 14,0-20, 4 q / ha.

Gradual application of phosphorus fertilizers in doses conduct to increased corn yields with these doses. The plus production registered was in average of 8.1% when we applying 80 kg P/ha.

The fertilization with nitrogen resulted in differences in achievement of very significant production.

For maize crop fertilization in the conditions of sandy soil from South-West of Oltenia we recommend as best doses in favorable years $N_{150-180}P_{80}$ and in dry years $N_{100-150}P_{80}$;

The crop rotation effect and mineral fertilization on chemical characteristics of the maize yield.

To highlight these effects were collected samples of corn grain harvested from experimental fields organized in the sandy soil from CCDCPN Dăbuleni.

Results for these chemical tests conducted revealed the following aspects:

- no matter what kind regardless of the particular type of rotation, the fertilization with increasing doses of nitrogen increased the nitrogen content of grains, suggesting an improvement in the level of nitrogen supply of plants;
- the greatest accumulation of nitrogen in the grains were observed for variants were maize was cultivated after wheat in the rotation of 4 years (wheat-corn-soybean-alfalfa);
- in the case of fertilization with $N_{80}P_{80}$ and $N_{160}P_{80}$ conduct to increases of 39% respectively 43% content of nitrogen compared to the unfertilized variant (figure 2)

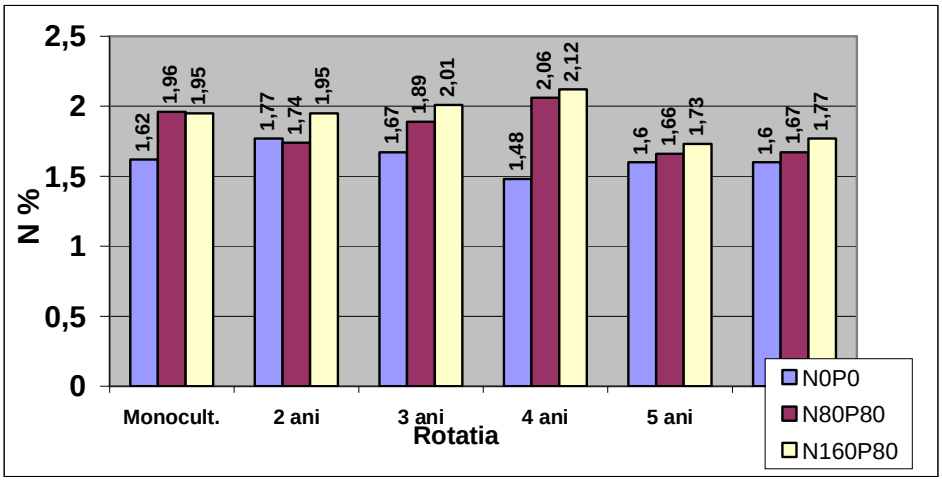

Figure 2. The effect of crop rotation and mineral fertilization to the Nitrogen content from corn seed

- The content of phosphorus in corn beans have changed under the influence of fertilization, and the type of rotation chosen (Figure 3), the highest values were registered to the rotation of 2 and 3 years on variants with high level o nitrogen ($N_{160}P_{80}$);

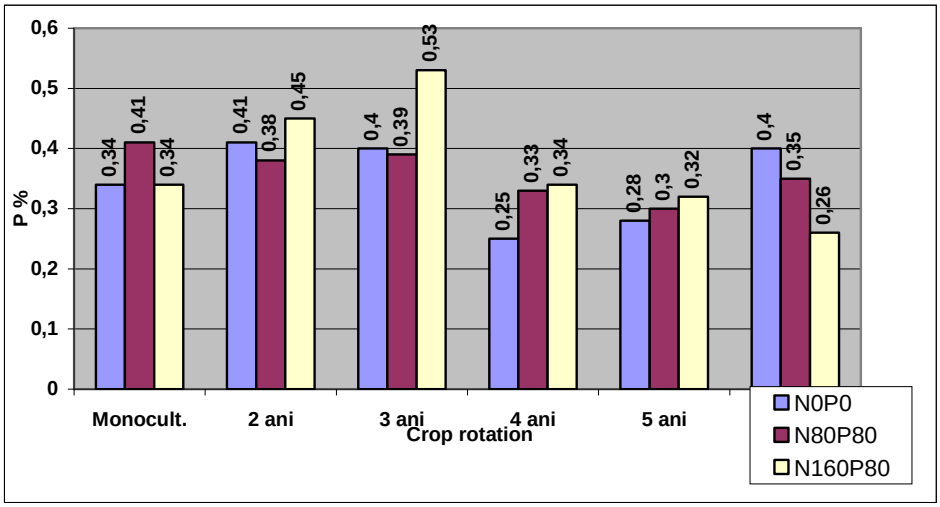

Figure 3. The effect of crop rotation and mineral fertilization to the Phosphorus content from corn seed

▪ The content of potassium, calcium and magnesium determined in corn beans have not changed under the influence of the factors studied (figure 4). The values of the determinate potassium in corn seed were close or identical at all experimented variants.

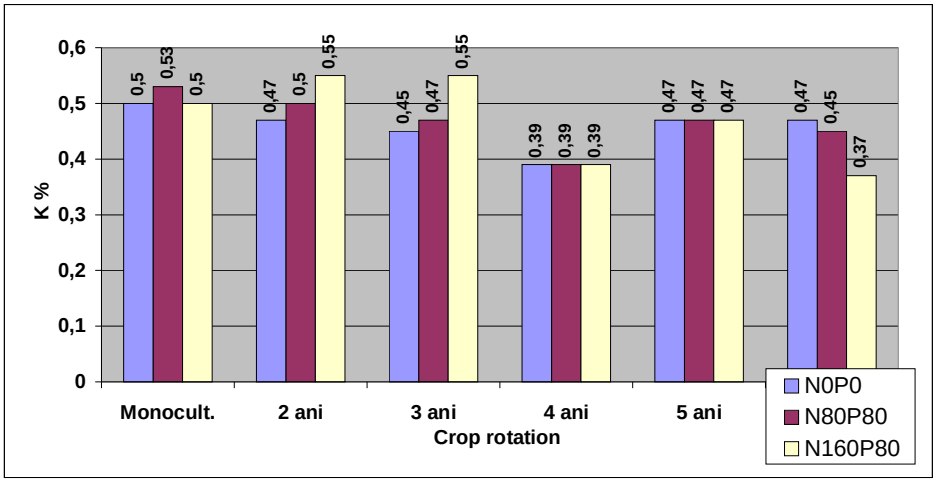

Figure 4. The effect of crop rotation and mineral fertilization to the Potassium content from corn seed

We can appreciate that type of rotation and fertilization did not affect the quality of grains of corn, the only effects were noticed on nitrogen variants. As a result of increased dose of nitrogen applied were observed increases in nitrogen content of corn beans.

CONCLUSIONS

From the previous presented data we can mentioned as distinctly the follow conclusions:

- In the conditions of sandy soil from CCDCPN Dăbuleni the maize culture gave good seed yields which varied between 4.5 q/ha on unfertilized variant and 38.5 q/ha in rotation of 6 years on $N_{160}P_{80}$;
- The most valuable rotations for maize crop proved to be thus who has in composition bean, soya, groundnuts or alfalfa;
- Applying fertilizers in monoculture conduct to small increase in production, increase that is not ensured as significant statistically point of view;
- The best variant with fertilizers has $N_{80}P_{80}$ who determinates increase on all rotations used and ensured a very significant plus production related to the witness;
- On all the experimented rotation, the fertilization with nitrogen conduct to improve the nitrogen content from maize seed and directly to increase the content of protein;
- Other macro and micro elements from the corn seed has registered small fluctuation, some of them could be considered as constant, no matter what kind of rotation was used.

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