INFLUENȚA FERTILIZĂRII ŞI A DISTANȚEI ÎNTRE RÂNDURI ASUPRA PRODUCȚIEI DE SOIA ÎN CONDIȚIILE PEDOCLIMATICE DIN CÂMPIA DE VEST

IMPACT OF FERTILISATION AND OF ROW DISTANCE ON SOY PRODUCTION IN THE SOIL AND CLIMATE CONDITIONS OF THE WESTERN PLAIN (ROMANIA)

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Abstract: *Between 2005 and 2007, we studied the impact of fertilisation (N_0, N_{30} and N_{60}, on a constant fund of $P_{80}K_{80}$) and of row distance (25 cm, 37.5 cm and 50 cm) on soy on the cambic chernozem in Timişoara. We also monitored the impact of fertilization and row distance on biometric features (plant height, number of pods per plant, and the insertion of the first pod level).*

Rezumat: *În perioada 2005-2007, am studiat influența fertilizării (N0, N30 şi N60, pe fond constant de P80K80) şi a distanței între rânduri (25 cm, 37,5 cm şi 50 cm) asupra recoltei la soia pe cernoziomul cambic de la Timişoara. De asemenea, am urmărit şi influența asupra măsurătorilor biometrice (înălțimea plantelor, numărul de păstăi pe plantă şi inserția primului etaj de păstăi).*

Key words: *soy, nitrogen dose, row distance*
Cuvinte cheie: *soia, doze de azot, distanță între rânduri*

INTRODUCTION

In the first vegetation phases, soy uses the nitrogen in the soil and then, if there is efficient symbiosis, it appeals to the fixed symbiotic nitrogen.

To note that soil nitrogen metabolism is much 'cheaper' energetically for the plant, which explains why plants appeal to symbiotic nitrogen only when soil nitrogen is not enough.

Though it is a mainly tillage crop (it is sown at a row distance of 50 cm), on clean beds, not covered by perennial or annual weeds resistant to herbicides, some cultivars yield good productions if sown on close rows. This is why in the research we carried out we studied these two elements (fertilisation and row distance) that have an impact on the crops.

MATERIAL AND METHOD

In order to point out the way in which fertilisation and row distance have an impact on the crops and on crop quality, during the three study years we developed bi-factorial trials after the subdivided plot method with three replications and with the following factor graduation:

- factor A – fertilisation level: $A_1\ N_0P_{80}K_{80}$; $A_2\ N_{30}P_{80}K_{80}$; $A_3\ N_{60}P_{80}K_{80}$;
- factor B – row distance: B_1 25 cm; B_2 37.5 cm; B_3 50 cm.

The cultivar we used was Agat. This cultivar is part of the demi-late cultivar group, capable of using the thermal potential of the area and of reaching maturity after the first white frosts.

RESULTS AND DISCUSSION

Synthesis results of the trial cycle (Table 1) point out the positive impact of nitrogen fertilisation applied on a constant fund of phosphorus and potassium ($P_{80}\ K_{80}$). Thus, fertilising with a starting dose of N_{30} increased the yield with 10%, the difference in yield of 216 kg/ha

being statistically ensured as significant.

Doubling the nitrogen dose from N to N_{60} amplified the increase to 21%, i.e. a difference in yield compared to the control variant N_0 of 467 kg/ha, statistically ensured as very significant.

Results during the three trial years concerning the impact of row distance pointed out that the cultivar under study found the most favourable conditions in the variant sown at a row distance of 37.5 cm, a variant in which the increase in yield was 14%, i.e. a significant difference of 305 kg/ha.

Increasing the distance to 50 cm, the distance practiced at present, diminished the increase in yield to only 10%, which makes it necessary to sow at a row distance of 37.5 cm on the fields cleaned from weeds.

Table 1

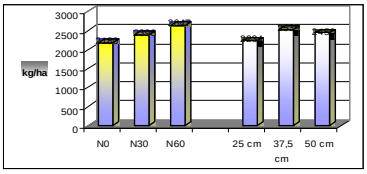
Synthesis of yield results during the trial cycle 2005-2007

A factor Agri - fund	B Factor – Row distance (cm)			Average Factor B			
	25 cm	37.5 cm	50 cm	Crop kg/ha	%	Difference Kg/ha	Significance
$N_0P_{80}K_{80}$	2010	2296	2233	2180	100	-	-
$N_{30}P_{80}K_{80}$	2254	2527	2407	2396	110	216	xx
$N_{60}P_{80}K_{80}$	2437	2794	2711	2647	121	467	xxx

DL5%=155kg/ha; DL 1% = 194 kg/ha; DL 0.1% = 223 kg/ha.

Average factor B

Specification	25	37.5	50
Crop (kg/ha)	2234	2539	2450
%	100	114	110
Difference (kg/ha)	-	305	216
Significance	-	xx	x



DL 5% = 225 kg/ha; DL 1% = 281 kg/ha; DL 0.1% = 319 kg/ha.

Results concerning the impact of fertilisation and row distance on plant height

As shown in Figure 1, plant height was influenced by nitrogen fertilisation on the same constant fund $P_{80}K_{80}$, ranging around 79.5 cm sown at a row distance of 50 cm and with no nitrogen fertilisation and 85.2 cm in the variant sown at a row distance of 25 cm and fertilised with a nitrogen dose of N60.

As a conclusion, nitrogen fertilisers influence plant height.

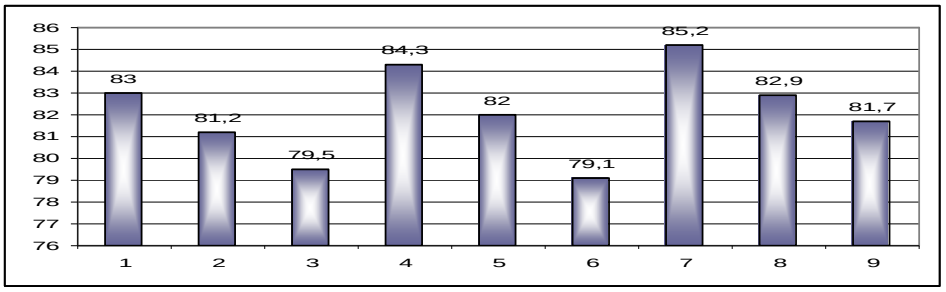
Increasing the row distance from 25 to 50 cm led to a decrease of the plant height with about 2 cm on all three agri-funds.

Results concerning the impact of fertilisation and row distance on the number of pods per plant

Figure 2 shows that at the level of the studied factors, variability amplitude ranged the variants between 36 and 47.5 pods per plant on the average.

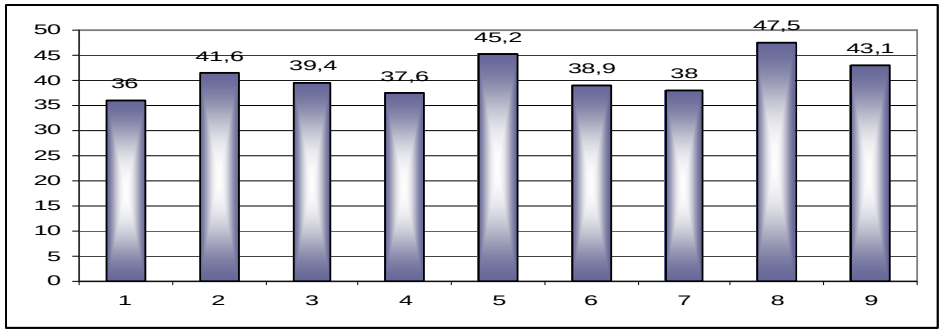
The impact of nitrogen fertilisers on the number of pods per plant was a favourable one; thus, in the variant sown on an agri-fund of $N_0P_{80}K_{80}$, it ranged between 36 and 41.6 pods per plant, in the variant fertilised with $N_{30}P_{80}K_{80}$ the number of pods per plant was somewhere around 37.6-45.2, and in the variant fertilised with $N_{60}P_{80}K_{80}$ the number of pods per plant was 38-47.5.

On all three agri-funds, the largest number of pods per plant and the highest yield were in the variant sown at a row distance of 37.5 cm.



	25 cm	37.5 Cm	50 cm	25 cm	37,5 cm	50 cm	25 cm	37.5 Cm	50 cm
	$N_0P_{80}K_{80}$			$N_{30}P_{80}K_{80}$			$N_{60}P_{80}K_{80}$		
X	83	81.2	79.5	84.3	82	79.1	85.2	82.9	81.7
S^2	3.9	2.98	2.74	2.51	2.9	3.43	2.86	2.24	2.31
S	2.10	2.01	2.0	1.92	2.05	2.3	2.04	1.8	1.85
S_X	0.23	0.21	0.20	0.19	0.21	0.22	0.20	0.18	0.19
S%	2.86	2.15	2.51	2.29	2.48	2.72	2.41	2.17	2.26

Fig 1. Plant height depending on row distance and on nitrogen dose (2005 – 2007)



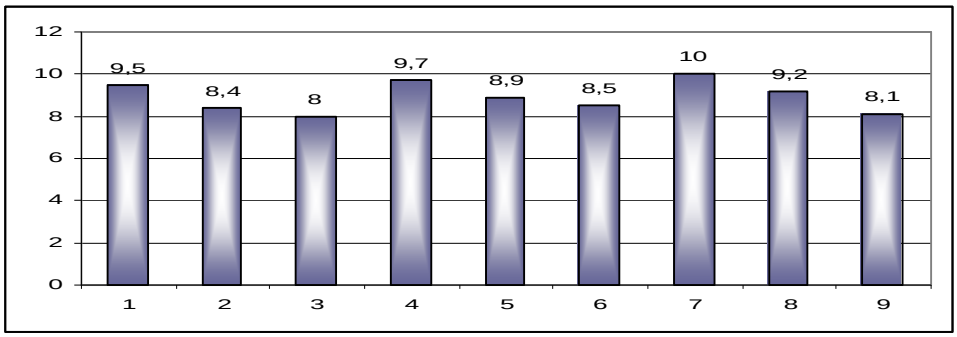
	25 cm	37,5 cm	50 cm	25 cm	37,5 cm	50 cm	25 cm	37,5 cm	50 cm
	$N_0P_{80}K_{80}$			$N_{30}P_{80}K_{80}$			$N_{60}P_{80}K_{80}$		
X	36	41,6	39,4	37,6	45,2	38,9	38	47,5	43,1
S^2	2,57	2,79	2,04	3,61	2,16	1,54	3,19	1,23	2,27
S	1,73	1,81	1,56	2,04	1,58	1,34	1,92	1,28	1,57
S_X	0,18	0,18	0,16	0,21	0,16	0,13	0,19	0,12	0,17
S%	4,58	4,12	3,69	5,23	3,68	3,71	4,29	2,27	3,56

Fig. 2 Number of pods per plant depending on row distance and on nitrogen dose (2005 – 2007)

Results concerning the impact of the interaction between fertilisation and row distance on the insertion of the first pod level

Results in Figure 3 point out that the insertion of the first pod level is low in all the variants, with low amplitude at the level of the studied factors.

Taking into account all this and the fact that the cutting devices cannot go below 10 cm, it is obvious that we risk losing the first pod level.



	25 cm	37,5 cm	50 cm	25 cm	37,5 cm	50 cm	25 cm	37,5 cm	50 cm
	$N_0P_{80}K_{80}$			$N_{30}P_{80}K_{80}$			$N_{60}P_{80}K_{80}$		
X	9,5	8,4	8,0	9,7	8,9	8,5	10,0	9,2	8,1
S^2	0,75	1,03	0,41	1,91	0,98	0,76	1,34	0,92	0,58
S	0,91	1,09	0,63	1,02	1,07	0,92	1,26	0,93	0,78
S_X	0,23	0,24	0,20	0,24	0,24	0,23	0,26	0,23	0,22
S%	11,13	15,12	9,19	12,11	13,5	12,5	14,68	11,63	10,18

Fig. 3. Impact of the interaction between fertilisation and row distance on the insertion of the first pod level (2005-2007)

CONCLUSIONS

In the conditions of a trial cycle of which two years were favourable to the crop, at the level of the trial factors, the crop level ranged between 2,010 and 2,794 kg/ha, which points out that in the reference area soy is a crop that should be part of the crop structure.

Nitrogen fertilisers applied on a constant agri-fund of P_{80} K_{80} had a favourable impact on the soy crop, the increase in yield being 10% for a dose of N_{30} and of 21% for a dose of N_{60}.

The Agat cultivar was influenced by row distance. Thus, increasing row distance from 25 to 37.5 cm we obtained an increase in yield of 14%. Increasing row distance to 50 cm is not justified, the increase in yield of 10% being inferior to that obtained for a row distance of 37.5 cm.

LITERATURE

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