RESEARCH CONCERNING THE INFLUENCE OF FERTILIZATION AND OF ROW DISTANCE ON CHICK PEA CROP AND CROP QUALITY

CERCETĂRI PRIVIND INFLUENȚA FERTILIZĂRII ŞI A DISTANȚEI ÎNTRE RÂNDURI ASUPRA RECOLTEI ŞI CALITĂȚII ACESTEIA LA NĂUT

Magdalena Carolina TRIFU, I. BORCEAN

Agricultural and Veterinary University of the Banat, Timişoara, Romania
Corresponding author: Carolina Trifu, e-mail:Carolina_trifu@yahoo.com

Abstract. *Research was carried out between 2004 and 2006, on a typical cambic chernozem in the area between the Mureş River and the Bega River. The cultivar under study was Cicero 1. Results pointed out that in the field under study, i.e. 12.50-50.00 cm, yield increased with distance row increase, at all nitrogen fertilisation levels (N_0, N_{30}, and N_{60}). Nitrogen fertilisers increased the yield with 13% for a dose of N_{30} and with 25% for a dose of N_{60}.*

Rezumat. *Cercetările s-au desfăşurat în perioada 2004-2006, pe un sol de tip cernoziom tipic, din zona de interfluviu Mureş-Bega. Soiul luat în studiu a fost Cicero 1. Rezultatele au evidenţiat că în domeniul cercetat 12,5cm - 50cm recolta a crescut odată cu creşterea distanţei între rânduri, pe toate nivelurile de fertilizare cu azot (N_0, N_{30}, N_{60}). Îngrăşămintele cu azot au mărit recolta cu 13% la nivelul dozei de N_{30} şi cu 25% la nivelul dozei de N_{60}.*

Key words**:** *chick pea, fertilising, and sowing distance.*
Cuvinte cheie: *năut, fertilizare, distanța de semănat.*

INTRODUCTION

Grain legume cultivation is a hopeful solution for covering protein deficit. Chickpea is a plant in full swing, which is motivated by the expansion of the desertification process on larger and larger areas in Romania and, therefore, by the need for cultivating highly drought-resistant plants.

Chickpea high content in protein, less fluctuating yields compared to climate disorders justify the expansion of this plant as a crop in the Western Plain too, where they can get equal yields or even higher yields than other legumes specific to the area.

MATERIAL AND METHOD

Trials have been of the bi-factorial type, organised after the sub-divided plot method with three replications, in which factor A was represented by sowing distance (12.50 cm, 25.00 cm, 37.50 cm, and 50.00 cm), and factor B was the nitrogen fertilisation level (N_0, N_{30}, N_{60}) applied on a constant agri-fund of $P_{60}K_{40}$.

The cultivar under study was Cicero 1.

The pre-emergent crop was winter wheat.

The cultivation technology was the one specific to this crop.

Upon harvesting, we measured protein content and we calculated protein yield.

Calculus of results has been done according to the setting method of the trial in the trial field.

RESULTS AND DISCUSSION

Synthesis data presented in Table 1 and in Figure 1 show that row distance has a considerable impact on yield level.

Thus, by doubling row distance (from 25.00 cm to 50.00 cm) we got an increase in yield of 16%; increasing row distance to 37.50 resulted in an extra 28.00%, and increasing row distance to 50.00 cm resulted in an extra 42.00%.

This could be explained by the tillage works between the rows, which were done mechanically at a row distance of 50 cm.

Nitrogen fertilisers, though it is about a legume, were well valorised by the plants.

Applying from the very beginning a dose of N_{30} resulted in an increase in yield of over 300 kg/ha, which is a significant difference. Doubling the dose (N_{60}) increased the yield with 25.00%, which corresponds to a very significant difference of over 700 kg/ha.

Table 1

Research concerning the influence of fertilisation and row distance on chick pea yield

Factorial A- row distance	Factorial B- fertilization level			A factorial averages			
	N_0	N_{30}	N_{60}	Crop (kg/ha)	%	Difference (kg/ha)	Significance
12,5 cm	2364	2685	2891	2647	100	-	
25 cm	2806	3159	3269	3078	116	431	XXX
37,5 cm	2983	3381	3810	3391	128	744	XXX
50 cm	3245	3703	4299	3749	142	1102	XXX

DL5%=203 kg/ha; DL1%=277 kg/ha; DL0.1%=372 kg/ha

B factorial averages

Specification	N_0	N_{30}	N_{60}
Crop (kg/ha)	2850	3232	3567
%	100	113	125
Difference (kg/ha)	-	382	717
Significance		X	XXX

DL5%= 352 kg/ha;
DL1%=480 kg/ha;
DL0.1%= 645 kg/ha.

Yield response curves to nitrogen fertilisers are presented in Figure 2, which shows that there is an increasing yield trend with the dose in the field under study (N_0, N_{30}, and N_{60}), trend that is constant also in the extrapolated field, up to N_{90}, particularly for larger sowing row distances.

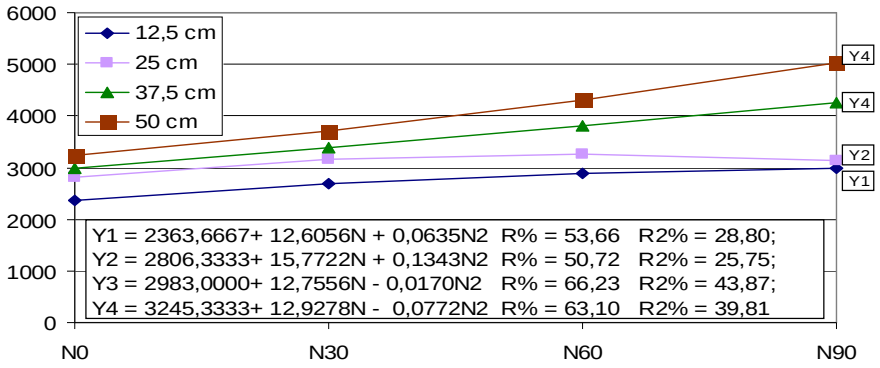

Figure 2. Response curve to different nitrogen fertilisation applied on a $P_{60}K_{40}$ fund in chick pea crop

Protein content was favourably influenced by nitrogen fertilisers: there are, in the field under study, increases of about 2.00 to 3.00%.

On the whole, in all the variants under study protein content kept within the limits characteristic to the soil.

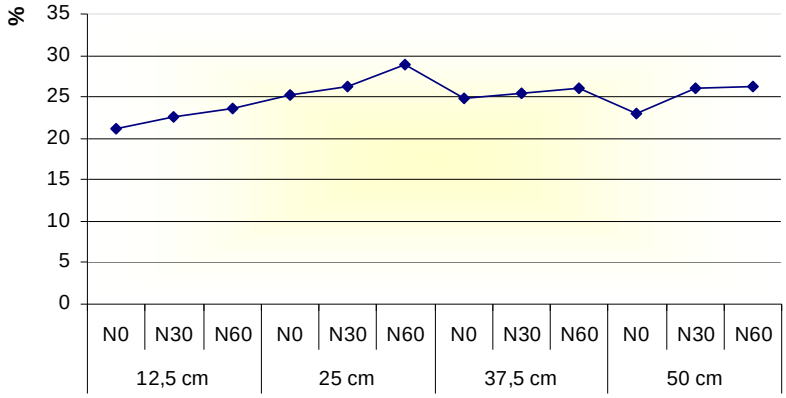

Figure 3. The variation of the protein content

On the ground of protein content and of yield, we have also calculated protein yield; results are shown in table 2.

We can see that protein yield was influenced mainly by the yield level. This is how we could explain protein yield, depending on row distance, of 38.00% in the variant in which row distance was 25.00 cm, 44.00% in the variant in which row distance was 37.50 cm, and 59.00% in the variant in which row distance was 50.00 cm, compared to the control variant, in which row distance was 12.50 cm.

Important increases of protein yield were also depending on nitrogen dose, i.e. 21.00% for a dose of N_{30}, and 39% for a dose of N_{60}.

Table 2

Protein yield of chick pea in 2004-2006

Factorial A- row distance	Factorial B- nitrogen doses			A factorial averages			
	N_0	N_{30}	N_{60}	Crop kg/ha	%	Difference kg/ha	Significance
12,5 cm	503	607	685	598	100	-	-
25 cm	708	829	945	827	138	299	XXX
37,5 cm	743	860	990	864	144	266	XXX
50 cm	748	963	1138	950	159	352	XXX

DL5%=42 kg/ha; DL1%=60 kg/ha; DL0.1%=87 kg/ha

B factorial averages

Specification	N_0	N_{30}	N_{60}
Crop (kg/ha)	676	815	940
%	100	121	139
Difference (kg/ha)		139	264
Significance		XX	XXX

DL5%=85 kg/ha;
DL1%=120 kg/ha;
DL0.1%= 174 kg/ha.

CONCLUSIONS

Cultivating chickpea in Banat areas with chernozems is motivated by the levels of the yields (between 3,000 and 4,000 kg/ha, i.e. raw protein yield of over 1,000 kg/ha).

Row distance influences the level of the yield which, under study conditions, was over 3,700 kg/ha in the variant in which sowing distance was 50.00 cm.

Nitrogen fertilisers applied as a starter on the agri-fund of $P_{60}K_{40}$ increased the yield with 13.00% for a dose of N_{30} and with 25% for a dose of N_{60}.

Protein content was favourably influenced by nitrogen fertilisation at the level of all the row distances.

Protein yield followed the same curve as that of grains, maximum values being obtained for a row distance of 50.00 cm and for a dose of N_{60}.

LITERATURE

1. IOAN BORCEAN, ADRIAN BORCEAN, 2003 – „*Cultura şi protecţia plantelor leguminoase cultivate pentru boabe*", Editura de Vest, Timişoara
2. BORCEAN I., DAVID GH., BORCEAN, A, *„Tehnici de cultură şi protecţie a cerealelor şi leguminoaselor"*, Timişoara, Ed. de Vest, 2006
3. BORCEAN, I., GOIAN, M., BORCEAN, A., 2001- „*Cultura şi protecţia plantelor de câmp"*, Timişoara, Ed. De Vest
4. FEHER ECATERINA, BORCEAN, I.,2003- *"Fitotehnie"*, Partea I, Craiova, Editura Universitaria
5. IOAN BORCEAN, ADRIAN BORCEAN, 2004- „*Cultura şi protecţia integrată a cerealelor, leguminoaselor şi plantelor tehnice"*, Editura de Vest, Timişoara
6. TRIFU MAGDALENA CAROLINA, 2006, - „*Rezultate parţiale privind influenţa fertilizării şi a tehnologiei semănatului asupra recoltei şi a calităţii seminţelor*", Catedra I, Fac. Agricultură
7. DAVID GH., PAUL PÎRŞAN, FL. IMBREA, 2006 – „*Tehnologia plantelor de câmp – Cereale, leguminoase pentru boabe şi plante tehnice"*, Ed. Eurobit, Timişoara
8. SIMONA NIŢĂ, „*Tehnologia culturilor de câmp"*, Ed. Eurobit, 2006