BEANS: A PROTEIN SOURCE IN SOUTH-WESTERN ROMANIA

FASOLEA – SURSĂ DE PROTEINĂ ÎN SUD-VESTUL ROMANIEI

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Abstract: *In this paper we present the results obtained in bean crops cultivated in south-western Romania through improving soil reaction, sowing density, and row spacing in order to increase both protein content and protein yield per ha. Correlating the three factors under study led to an increase of the bean yield with 23% on an amended agri-fund while the protein yield per ha increased depending the studied factor with 10-27%.*

Rezumat: *În această lucrare sunt prezentate rezultatele obţinute la cultura de fasole cultivată in partea de S-SV a Banatului prin optimizarea corectării reacţiei solului, a densităţii de semănat şi a distanţei între rânduri în vederea creşterii atât a conţinutului cât şi a producţiei de proteină care se obţine la hectar. Corelarea celor trei factori studiaţi a dus la creşterea producţiei de boabe cu 23% pe fond amendat, iar producţia de proteină obţinută la hectar a crescut în funcţie de factorul studiat între 10 – 27%.*

Key words*: *bean, protein content, protein yield
Cuvinte cheie*: *fasole, conţinut de proteină, producţie de proteină

INTRODUCTION

According to F.A.O., over 500 million people in the world eat bean - the subject of this study.

At present, it is cultivated in 92 countries, on a surface that overpasses 25 million ha.

In Romania, at present, it is cultivated on private lands on a surface between 29,000 and 105,000 ha. In addition, it has been cultivated in bean-maize interpolated cultures on a surface that sometimes overpasses 400,000 ha.

The yields per ha do not fit the expectations.

Therefore new technological solutions are needed to ensure economical efficiency for cultivators.

MATERIAL AND METHOD

Researches on sowing technology were carried on in both areas. Tri-factorial experiments were made after the subdivided plot method, with three repetitions, with the following factorial graduations:

Factor A - soil reaction correction:
a_1 - not amended $N_{60}P_{4o}K_{4o}$;
a_2 - amended 75% Ah $N_{60}P_{4o}K_{4o.}$

Factor B - row distance (cm): b_1 - 30 cm;
b_2 - 50cm;
b_3 - 70 cm.

Factor C – number of germinating grains/ m^2:
c_1 - 40 b.g./ m^2;
c_2 - 60 b.g./ m^2;
c_3 - 80 b.g./ m^2.

In featuring the climate of the areas mentioned above, we used meteorological data registered at the Meteorological Station in Bozovici.

The soil type in the experimental field was a typical alluvial one, with the following important features:

- low acid soil reaction (pH= 5.9);
- low humus content (1.90 in the first 15 cm);
- good nitrogen, phosphorus, and potassium saturation;
- coarse medium texture.
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RESULTS AND DISCUSSION

On the average for the three experimental years (Table 1), depending on the factors under study, yields ranged between 1,242 kg/ha on the not-amended soil, in the variant with a row spacing of 30 cm, sowed with 80 germinating grains per m^2, and 2,011 kg/ha on the amended soil, in the variant with a row spacing of 70 cm, sowed with 80 germinating grains per m^2.

On the average for the experimental row spacing and sowing densities, on the soil fertilised evenly with $N_{60}P_{40}K_{40}$, by applying amendments, we got an increase in yield of 23.00%, i.e. 330 kg/ha.

In the field of study, increasing row spacing from 30 cm to 50 cm resulted in an increase in yield of 9% (133 kg/ha), and increasing row spacing to 70 cm, an increase in yield with 19%, (428 kg/ha).

Among sowing densities we noted the variant with 60 germinating grains/m^2 in which we recorded an increase in yield of 4%. Increasing sowing density to 80 germinating grains/m^2 is not motivated, resulting in a yield decrease with 7% compared to the yield recorded in the variant sowed with 40 germinating grains/m^2.

Table 1

Synthesis of the research on the influence of density and of row distance on the crop in the Almăj Depression area

Specification	Row distance (cm)	Number of germinating grains /m^2			Average agri-funds			
		40	60	80	Yield kg/ha	%	Difference kg/ha	Significance
$N_{60}P_{40}K_{40}$ Not amended	30	1271	1376	1424	1405	100		
	50	1410	1451	1323				
	70	1558	1597	1426				
$N_{60}P_{40}K_{40}$ Amended	30	1609	1643	1472	1735	123	330	xx
	50	1735	1817	1671				
	70	1922	2011	1735				

DL 5%= 145; DL1%= 227; DL 0.1%= 358.

Average number of germinating grains /m^2

Specification	40 b.g./m^2	60 b.g./m^2	80 b.g./m^2
Yield kg/ha	1584	1649	1478
%	100	104	93
Difference kg/ha		65	-106
Significance			0

DL 5%= 104; DL 1%= 154; DL 0.1%= 202

Average row distance

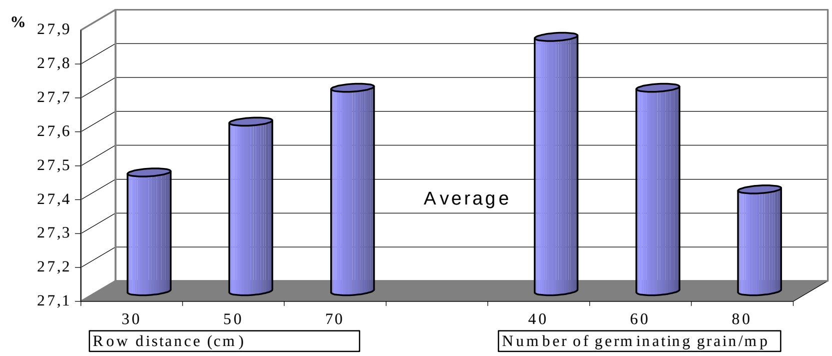
Specification	30 cm	50 cm	70 cm
Yield kg/ha	1435	1568	1708
%	100	109	119
Difference kg/ha		133	428
Significance		Xxx	xxx

DL 5%= 74; DL 1%= 98; DL 0.1%= 138.

By applying calcium amendments at a neutralising level of 75% of the Ah we got an increase of the protein content with 85% (Figure 2).

Among the experimental row spacing the highest content was in the variant sowed at a row spacing of 70 cm, i.e. 1.14% higher than that in the variant sowed at a row spacing of 30 cm.

By increasing sowing density above 40 germinating grains/m^2 we recorded a decrease of the content with 0.35% in the variant sowed with 60 germinating grains/m^2 and with 1.08% in the variant sowed with 80 germinating grains/m^2.



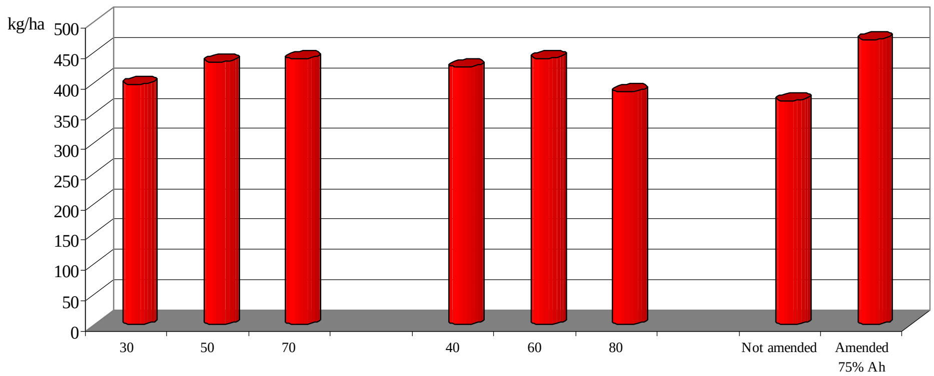
Specification	Row distance (cm)			Number of germinating grains/m^2			Average	Difference
	30	50	70	40	60	80		
Not amended	27.1	27.3	27.3	27.7	27.4	27.0	27.30	
Amended	27.8	27.9	28.1	28.0	28.0	27.8	27.93	0.63
Average	27.45	27.60	27.70	27.85	27.70	27.40		
Difference		0.15	0.25		- 0.15	- 0.45		

Figure 2. Protein content in the Almăj Depression area

Protein yield (Figure 3) was not significantly different in the variants sowed at a row spacing of 30 cm and 50 cm and increased visibly with 42 kg/ha, in the variant sowed at a row spacing of 70 cm.

By using sowing densities of 40 and 60 germinating grains/m^2 the amount of protein was practically equal. Increasing sowing density to 80 germinating grains/m^2 is not justified, since it does not result in an increase of the protein with over 40 kg/ha.

On the fund amended, on the average for experimental row spacing and sowing density we got an amount of protein higher with 27%, compared to the soil not amended.



Specification	Row distance (cm)			Number of germinating grains/m^2			pH correction	
	30	50	70	40	60	80	Not amended	Amended 75% Ah
Yield kg/ha	397	434	439	426	440	385	370	471
%	100	109	111	100	103	90	100	127
Difference kg/ha		37	42		14	- 41		101
Significance			X			00		XX

DL 5%= 41; DL 1%= 62; DL 0.1%= 90; DL 5%=24; DL 1%= 27; DL 0.1%= 57; DL 5%= 34; DL 1%= 72; DL 0.1%=105.

Figure 3. Protein yield depending on row distance, on sowing density, and on soil reaction correction registered in the Almăj Depression area

CONCLUSIONS

Calcium amendments at a 75% neutralisation level of Ah resulted in an increase of crops of 23% in the area of alluvial soils.

Increasing row distance from 30 to 50 cm increased bean crops on the average with 9% in the area of alluvial soils. The biggest crop was of 19% in the alluvial soil area for a 70 cm row distance.

Optimum density in sowing is of 40-50 germinating grains/m^2. Increasing density to 80 germinating grains/m^2 is not justified, as it leads to a crop diminution with 7%.

The biggest protein amount was in the case 50-70 CM row distance, with a density of 40-60 germinating grains /m^2.

LITERATURE

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