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 obținute la cultura de fasole cultivată în partea de S-SV a Banatului prin optimizarea corectării reacției solului, a densității de semănă și a distanței între rânduri în vederea creșterii atât a conținutului cât și a producției de proteină care se obține la hectar. Corelarea celor trei factori studiați a dus la creșterea producției de boabe cu 23% pe fond amendat, iar producția de proteină obținută la hectar a crescut în funcție de factorul studiat între 10 – 27%.

Key words: bean, protein content, protein yield
Cuvinte cheie: fasole, conținut de proteină, producție 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
Reseaches 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:
    a₁ - not amended N₀P₀K₀;
    a₂ - amended 75% Ah N₀P₀K₀;

Factor B - row distance (cm):
    b₁ - 30 cm;
    b₂ - 50 cm;
    b₃ - 70 cm;

Factor C – number of germinating grains/ m²:
    c₁ - 40 b.g./ m²;
    c₂ - 60 b.g./ m²;
    c₃ - 80 b.g./ m².
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.

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 m², 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 m².

On the average for the experimental row spacing and sowing densities, on the soil fertilised evenly with N₆₀P₄₀K₄₀, 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/m² in which we recorded an increase in yield of 4%. Increasing sowing density to 80 germinating grains/m² is not motivated, resulting in a yield decrease with 7% compared to the yield recorded in the variant sowed with 40 germinating grains/m².

Table 1

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Row distance (cm)</th>
<th>Number of germinating grains /m²</th>
<th>Average agri-funds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>N₀P₀K₀</td>
<td>30</td>
<td>1271</td>
<td>1376</td>
</tr>
<tr>
<td>Not amended</td>
<td>50</td>
<td>1410</td>
<td>1451</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>1558</td>
<td>1597</td>
</tr>
<tr>
<td>N₀P₀K₀</td>
<td>30</td>
<td>1609</td>
<td>1643</td>
</tr>
<tr>
<td>Amended</td>
<td>50</td>
<td>1735</td>
<td>1817</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>1922</td>
<td>2011</td>
</tr>
</tbody>
</table>

Average number of germinating grains /m²

<table>
<thead>
<tr>
<th>Specification</th>
<th>40 b.g./m²</th>
<th>60 b.g./m²</th>
<th>80 b.g./m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield kg/ha</td>
<td>1584</td>
<td>1649</td>
<td>1478</td>
</tr>
<tr>
<td>%</td>
<td>100</td>
<td>104</td>
<td>93</td>
</tr>
<tr>
<td>Difference kg/ha</td>
<td>65</td>
<td>-106</td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Average row distance

<table>
<thead>
<tr>
<th>Specification</th>
<th>30 cm</th>
<th>50 cm</th>
<th>70 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield kg/ha</td>
<td>1435</td>
<td>1568</td>
<td>1708</td>
</tr>
<tr>
<td>%</td>
<td>100</td>
<td>109</td>
<td>119</td>
</tr>
<tr>
<td>Difference kg/ha</td>
<td></td>
<td>133</td>
<td>428</td>
</tr>
<tr>
<td>Significance</td>
<td></td>
<td>xxx</td>
<td>xxx</td>
</tr>
</tbody>
</table>

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/m² we recorded a decrease of the content with 0.35% in the variant sowed with 60 germinating grains/m² and with 1.08% in the variant sowed with 80 germinating grains/m².

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/m² the amount of protein was practically equal. Increasing sowing density to 80 germinating grains/m² 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.
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/m². Increasing density to 80 germinating grains/m² 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 /m².

LITERATURE

1. Imbrea, FL., “Contribuții la tehnologia de cultivare a fasolei pentru boabe in Banat, Teză de doctorat – Facultatea de Agricultură, Timișoara, 2001