

STUDY CONCERNING THE INTRODUCTION AND EXPANSION OF CHICKPEA IN SOUTH-WESTERN ROMANIA

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Abstract: The continuous aridisation of the last decades in the area of the rivers Caraş and Nera requires crops resistant to drought. Among legumes cultivated for their beans, chickpea is a crop that deserves the attention and care of agriculturists due to its good yielding capacity – 2.5-3.5 t/ha – and to its good adaptability to soil and climate conditions. Research was carried on a brown, luvic, vertic, pseudo-gleyed, moderately-strong decarbonated soil at Răcăşdia, in the Oraviţa Depression. The paper presents data concerning the Cicero I, Burnas, and Rodin cultivars, with differentiated fertilisation, and with impact on the number of ramifications per plant, on the number of pods per plant and on bean yield. The study also contains data concerning the impact of studied intervention factors on protein content and production. Medium protein content was 24.7% in the cultivar Cicero I, 24.9% in the

cultivar Burnas, and 23.8% in the cultivar Rodin. On the average per the three cultivars, protein yield increased with 20.0% in the variants fertilised with N_{40} and with 48.0% in the variants fertilised with N_{60} . The chickpea plants were little attacked by *Ascochyta rabies*, i.e. a medium attack below 2.0%, which was due exclusively to the precipitations regime, a deficitary one compared to the pathogen requirements. After grain formation, another pathogen occurred in the chickpea crop, *Uromyces ciceris-arietini*, with an almost a symbolical presence of only 2.0-3.0% attack in all experimental variants, i.e. below economic damage threshold. The final part of the paper contains practical recommendations for cultivators. The paper is financially supported by the CNCSIS research project entitled „Developing lentil and chickpea cultivation technology in the soil and climate conditions of the Timiş-Caraş-Nera area”.

Keywords: chickpea, cultivars, fertilisation

INTRODUCTION

Chickpea is an important legume because its seeds contain 20-25% proteins used under different forms in both human food and in some animal feed.

At present, world area cultivated with chickpea is over 12 million ha, of which 90% in Asia.

In Romania, the area cultivated with chickpea has diminished the last two decades from over 10,000 ha to about 1,000 ha. This cannot be explained, since chickpea is the most drought-resistant of all the legumes cultivated for their beans.

Chickpea culture in Romania is done mainly in Dobrogea, southern Moldavia and south-eastern Romanian Plain. The present research aimed at testing the opportunities of expanding the crop in some areas in Western Romania, where this crop is practically unknown.

MATERIAL AND METHODS

The experiments were carried out on a brown, luvic, vertic soil, pseudo-gleyed, moderate-strongly decarbonated on the area of Răcăşdia, in the Oraviţa Depression, a soil less favourable to chickpea culture, and which yields at its best on soils with medium texture and rich in calcium. From a climate point of view, the area is very favourable to chickpea cultivation.

The experiments were bi-factorial, with Factor A represented by the cultivar (Cicero I, Burnas, and Rodin), and Factor B was represented by the variable rates of nitrogen (N_0 , N_{40} ,

and N₆₀) applied on a constant agri-fund of P₆₀K₆₀, with three replications. Grain maize was the pre-emergent plant, fertilised with 20 t/ha manure.

Sowing was done during the last decade of March, at a 50-cm row distance, with a density of 60 germinating grains/m².

Weed control was ensured by pre-emergent application of herbicides – 5 l/ha Treflan and 2 l/ha Basagran post-emergent.

RESULTS AND DISCUSSION

Table 1 shows yield results: we can see that in the studied area the span was between 1600 and 2800 kg.

Comparing the behaviour of the cultivars on the average for the three fertilisation levels, the highest yields were in the cultivars Burnas and Rodin in which yields were higher (9% in Burnas and 15% in Rodin, respectively) compared to the yield of the control Cicero I.

Table 1.

Yield results depending on cultivar and fertilisation

Factor A Cultivar	Factor B – Nitrogen rate on an agri-fund of P ₆₀ K ₆₀			Averages of the Factor A			
	N ₀	N ₄₀	N ₆₀	Yield kg/ha	%	Difference kg/ha	Significance
Cicero I	1608	1920	2360	1963	100		
Burnas	1770	2115	2505	2130	109	167	x
Rodin	1805	2207	2783	2265	115	302	xxx

DI 5.0% = 128 kg/ha
DI 1.0% = 173 kg/ha
DI 0.1% = 236 kg/ha

Averages of the Factor B

Specification	N ₀	N ₄₀	N ₆₀
Yield kg/ha	1727	2081	2549
%	100	120	147
Difference kg/ha		354	822
Significance		xxx	xxx

DI 5.0% = 121 kg/ha, DI 1.0% = 169 kg/ha, DI 0.1% = 259 kg/ha.

Differences in yield are ensured as significant in the cultivar Burnas and very significant in the cultivar Rodin.

Nitrogen fertilisers were very well valorised by the cultivars under study, the increase in yield reaching 20.0% for a nitrogen rate of N₄₀ and 45.0% for a nitrogen rate of N₆₀. Differences in yield of 359 kg/ha (N₄₀) and 822 kg/ha (N₆₀) were statistically ensured as very significant.

Figures 1, 2, and 3 present measurement results concerning the evolution of the number of ramifications, of the number of pods per plant, and of the number of beans per plant depending on the cultivar.

The number of ramifications per plant varied between 3.85 in the cultivar Rodin and 4.45 in the cultivar Burnas.

The number of pods per plant oscillated between 50.0 in the cultivar Cicero and 58.0 in the cultivar Rodin

The number of beans per plant varied between 60.0 in the cultivar Cicero I and 76.0 in the cultivar Rodin.

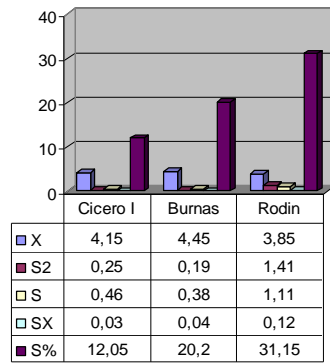


Fig. 1 Number of ramifications per plant

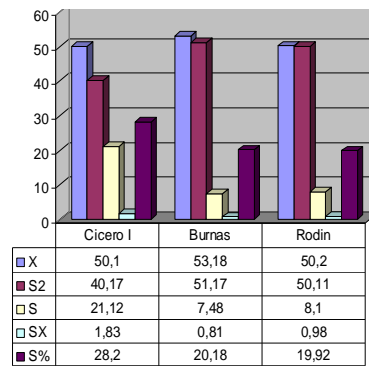


Fig. 2 Number of pods per plant

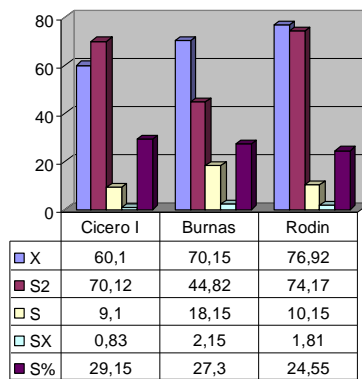


Fig. 3 Number of beans per plant

Average protein content was 24.7% in the cultivar Cicero I, 24.9% in the cultivar Burnas, and 23.8% in the cultivar Rodin.

On the ground of protein content and of average yield, we calculated protein yield as shown in Table 2.

Table 2.

Protein yield (kg/ha) depending on cultivar and fertilisation

Factor A Cultivar	Factor B – Nitrogen rate on an agri-fund of P ₆₀ K ₆₀			Averages of the Factor A			
	N ₀	N ₄₀	N ₆₀	Protein yield	%	Differenc e kg/ha	Significance
Cicero I	397	474	583	485	100		
Burnas	441	527	623	530	109	45	
Rodin	429	525	662	539	111	54	

DI 5.0% = 63

DI 1.0% = 88

DI 0.1% = 117

Averages of the Factor B

Specification	N ₀	N ₄₀	N ₆₀
Yield kg/ha	422	509	623
%	100	120	148
Difference kg/ha		87	201
Significance			xx

DI 5.0% = 111, DI 1.0% = 151, DI 0.1% = 202

Results point out that on the average for the three agri-funds protein yield makes no difference between the cultivars from a statistical point of view.

Nitrogen fertilisers increased protein yield on the average for the studied cultivars with 20.0% for a nitrogen rate of N₄₀ and with 48.0% for a nitrogen rate of N₆₀.

CONCLUSIONS

Chickpea can be a solution in the crop structure of the studied area, where it ensures yields between 1,600 kg/ha and 2,800 kg/ha.

The cultivars Cicero I, Burnas, and Rodin, on the average for the three experimental fertilisation levels, yielded similar amounts. The best results were in the cultivar Rodin that yielded 350 kg/ha more than the control cultivar, i.e. a very significant difference.

Nitrogen fertilisers were well valorised, the average increase in yield for and the three cultivars being 20.0% for a nitrogen rate of N₄₀ and N₆₀.

Average protein content was 24.7% in the cultivar Cicero I, 24.9% in the cultivar Burnas, and 23.8% in the cultivar Rodin.

Protein yield on the average for the three cultivars increased with 20.0% in the variants fertilised with N₄₀ and with 48.0% in the variants fertilized with N₆₀.

The plants were weakly attacked by *Ascochyta rabies*, with medium attack intensity below 2%, due exclusively to the deficitary rainfall regime compared to the pathogen's requirements. After bean formation, another pest attacked the crop, *Uromyces ciceris-arietini* but, as in the case of the other pathogen, its presence was symbolic, i.e. an attack intensity between 2-3% in all experimental variants, below economic damage threshold.

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