THE STUDY OF THE CLIMBING POD BEANS REGARDING THE INFLUENCE OF THE CULTIVAR AND PLANT DENSITY ON SEED PRODUCTION / HECTARE UNDER THE ENVIRONMENTAL CONDITIONS OF ZONE IERNUT

STUDIUL INFLUENȚEI CULTIVARULUI ŞI A DENSITĂȚII PLANTELOR/HA ASUPRA PRODUCȚIEI DE SEMINȚE/HA LA FASOLEA DE PĂSTĂI URCĂTOARE, ÎN CONDIȚIILE DE MEDIU ALE S.C.D.L. IERNUT

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Abstract. *The paper presents the research results from a bifactorial experiment carried out at Vegetable Research and Development Station Iernut. Experimental factors were four cultivars (Mădărăşeni cultivar and three perspective lines – Alina, Ghiboleasca and Viola-2) and three crop density determined by the number of plants in a hole (2 ,3 and 4 plants / hole). The goal of the experiment was to evaluate the influence of the two factors on the seed production. The best result was obtained for all the cultivars and a density of two plants/hole.*
Keywords: climbed, bean pods, cultivar, density, production

Rezumat. *Lucrarea prezintă rezultatele de cercetare obținute într-o experiență de tip bifactorial organizată în condițiile de la Stațiunea de Cercetare Dezvoltare pentru Legumicultura Iernut. Factorii experimentali luați în studiu au fost reprezentați de patru cultivare (Mădărăşeni şi trei linii de perspectivă - Alina, Ghiboleasca şi Viola-2) şi trei densități de cultură determinate de numărul de plante dintr-un cuib (2, 3 şi 4 plante / cuib). Scopul acestei cercetări a fost evaluarea influenței celor doi factori asupra producției de semințe. Cel mai bun rezultat a fost obținut pentru toate cultivarele la o densitate de două plante / cuib.*
Cuvinte cheie: urcătoare, fasole păstăi, cultivare, densitate, producție

INTRODUCTION

The bean is an important vegetable species for both pods and grains (Avasilcăi *et al.*, 2017; Hamburdă *et al.*, 2016; Teliban *et al.*, 2014, 2015). This paper refers to the production of seeds per unit area. Local populations were studied and were created through the ameliorative selection, under the conditions from Transilvania area, valuable lines of climbing beans for pods.

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MATERIAL AND METHODS

The biological material used, is part of the Măldăreşeni cultivar and of grains ameliorative lines which are valuable for Transylvania's conditions (L-Alina, L-Grasa of Iernut (Ghiboleasca) and a4-L-Viola-2. The experiment has been organized in a split plot design with four replicates for the two factors: cultivar and density.

- the A-factor (the cultivar), with four graduations: A_1 - Măldărăşeni, A_2 - L-Alina, A_3 - L-Grasa of Iernut (Ghiboleasca) and A_4 - L-Viola-2;

- the B-factor, the number of plants per planting hole, with three graduations: b1 - two plants on the planting hole, b2 - three plants on the planting hole and b3 - four plants on the planting hole. The distance between rows was of 80 cm and the distance between the planting holes was of 25 cm (Ruşti and Munteanu, 2008; Stan *et al.*, 2003; Teodorescu *et al.*, 2012, 2014).

The influens of experimental factors was evaluated by the seed yield of each graduation of factors (Ceapoiu, 1968).

RESULTS AND DISCUSSION

The biological material used was characterized by specific features of the cultivar (tab. 1, tab. 2).

Table 1

Cultivars' description

The cultivar	Precocity	Vegetation period	Moment of crop establishment	
			For pods	For seed
Mădărăşeni	Early	77	1 – 10.05	20.04
L – Alina	Belated	115	30.04 – 05.05	25.04
L – Ghibolească	Semi-early	78	05.05 – 10.05	30.04
L – Viola-2	Semi-belated	85	03.05 – 10.05	20.04

Fig. 1 Măldărăşeni Variety - plants, pods and flowers

From the analysis of the influence of factor "A", it was found that compared to witness "A_1" cultivar was a difference: very significantly negatively for "A_2" cultivar and significantly positively for "A_3" cultivar (tab. 2).

Fig. 2 L-Alina - plant, pods and flowers

Table 2

The influence of factor "A"

The factor	Production		Diff. t/ha	Meaning
	t/ha	%		
A_1	3.4	100	Mt	Mt
A_2	2.76	81.17	- 0.64	000
A_3	3.9	114.7	0.5	***
A_4	3.66	107.6	0.26	*

LSD 5% = 0.104 x 2.26 = 0.235 t/ha
LSD 1% = 0.104 x 3.25 = 0.338 t/ha
LSD 0.1% = 0.104 x 4.78 = 0.497 t/ha

Table 3

Multiple comparisons of factor B

Clasification	Production (t/ha)	The difference between the variant from the ...place		
		III – B_3	**II – B_2**	**I – B_1**
I – B_1	4.6	2.35**	1.15	-
II – B_2	3.45	1.2	-	
III - B_3	2.25	-		

LSD 5% = 0.761 x 2.06 = 1.567 t/ha
LSD 1% = 0.761 x 2.8 = 2.13 t/ha
LSD 0.1% = 0.761 x 3.75 = 2.85 t/ha

The analysis of the multiple comparisons of factor "B" at the same graduation of "A" showed the significant positively differences between "B_1" and "B_3" from all cultivars, distinctly significant from the other comparisons especially for L-Ghimbolesca cultivars, L-Viola-2 or significant in the case of Mădărăşeni and L - Alina (tab. 4) cultivars.

Table 4

Multiple comparisons of factor "B" at the same graduation of "A" regarding production of seed /he

Clasification		Production (t/ha)	The difference between the variant from the place		
			III	**II**	**I**
A_1	**I**	4.5	2.2***	1.1*	-
	II	3.4	1.1*	-	
	III	2.3	-		
			III	II	I
A_2	**I**	3.7	1.9***	0.9*	-
	II	2.8	1.0*	-	
	III	1.8	-		
			III	II	I
A_3	**I**	5.2	2.6***	1.3**	-
	II	3.9	1.3**	-	
	III	2.6	-		
			III	II	I
A_4	**I**	5.0	2.7***	1.3**	-
	II	3.7	1.4**	-	
	III	2.3	-		

LSD 5% = 0.416 x 2.06 = 0.857 t/ha;
LSD 1% = 0.416 x 2.8 = 1.165 t/ha
LSD 0.1% = 0.416 x 3.75 = 1.56 t/ha

The meanings of the differences between the variants (seed production per hectare) have shown very clearly and also through the analysis of comparing two "A's" average at the same graduation of B or at different graduations of B (tab. 5).

Table 5

Comparison of two "A's" average at the same graduation of "B" or "B's" different graduations (the production of seed per hectare)

The factor	t/ha	The difference between the variant from the place										
		XII	XI	X	IX	VIII	VII	VI	V	IV	III	II
I– A_3B_1	5.2	3.4***	2.9***	2.9***	2.6***	2.4***	1.8***	1.5***	1.5***	1.3***	0.7**	0.2
II– A_4B_1	5.0	3.2***	2.7***	2.7***	2.4***	2.2***	1.6***	1.3***	1.3***	1.1***	0.5*	-
III– A_1B_1	4.5	2.7***	2.2***	2.2***	1.9***	1.7***	1.1***	0.8***	0.8***	0.6**	-	
IV– A_3B_2	3.9	2.1***	1.6***	1.6***	1.3***	1.1***	0.5*	0.2	0.2	-		
V– A_2B_1	3.7	1.9***	1.4***	1.4***	1.1***	0.9***	0.3	0	-			
VI- A_4B_2	3.7	1.9***	1.4***	1.4***	1.1***	0.9***	0.3	-				
VII– A_1B_2	3.4	1.6***	1.1***	1.1***	0.8***	0.6**	-					
VIII– A_2B_2	2.8	1.0***	0.5*	0.5*	0.2	-						
IX– A_3B_3	2.6	0.8***	0.3	0.3	-							
X– A_1B_3	2.3	0.5*	0	-								
XI- A_4B_3	2.3	0.5*	-									
XII- A_2B_3	1.8	-										

CONCLUSIONS

1. The four cultivars are highly valued by consumers, although they are differentiated by different quantitative and qualitative features.

2. As result of the capacity of seed production, the cultivars can be classified in the following order: L-Ghimboleasca, L-Viola 2, Mădărăşeni, L-Alina.

3. In all cultivars, we obtained the highest seed production for B_1 (two seed / the hole) the establishment saving biological material culture.

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