

SOWING DENSITY AND FERTILIZATION INFLUENCE ON FABA BEAN SEED PRODUCTION (*Vicia faba* L. var. *major*. Harz) UNDER ECOLOGICAL CONDITION FROM BUCOVINA OBCINES

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Abstract

In the researches conducted in the period 2012-2014, it noticed the influence of sowing density and fertilization influence on grain production of faba bean seed (*Vicia faba* L. var. *major*. Harz) under the mountain area conditions of the county Suceava. The researches were conducted at the Agricultural Research Center of Pojorâta (which it focused foothill and mountain areas of Bucovina Obcine), on lytic alluvial soil pH (water) 5.1, 2.9 humus content, phosphorus (P_{AL}) 45 ppm potassium (K_{AL}) 80.5 ppm, the degree of base saturation (V) 57.1 and nitrogen index (IN) 2.18. It followed in a bifactorial experience of type 2 x 7, the influence of sowing density with two graduations (20 grains germinable/m² and 40 bg/m²) and fertilization with seven graduations (unfertilized, 40N, 60P₂O₅, 40N60P₂O₅, 40N60P₂O₅60K₂O, 40t/ha manure 40t/ha manure + 40P₂O₅). Analyzing the average for the three research years it showed that at the faba bean from major variety, the most effective sowing density is 40 g.s./m², when it could achieve, productions up to 4000 kg/ha, that combined administration of fertilizers with nitrogen and phosphorus achieved yield increases distinct significantly and through applying of manure at a dose of 40 t/ha and at the density of 40 g.s./m² it could be achieved yield increases, very substantial.

Key words: *Vicia faba*, var. *major*, cold and wet areas, density, fertilization

Among the technological elements, a very important role belongs sowing density setting that best respond to specific environmental conditions. The plant density issue has acquired a greater importance since its achievement stay at basis of obtaining high yields with minimal additional costs. In the European countries in recent years it was achieved, more researches referring to sowing methods of faba bean (Vrcok F., 1972 J. Picard, Sigwalt C., 1962 Padimatos C., AJ Karamonos 1991 Walter R. 1974, Comarovschi Gh., 1973 Mlesnita V., 1986, Saghin Gh., 1996). Like all plants, faba bean, for growth and development needs along the other vegetation factors such as nutrients including the crucial role have nitrogen, phosphorus, potassium and calcium. Faba bean is very demanding towards nitrogen and potassium and picky for phosphorus and calcium. Its requirement to nitrogen resides in the fact that the entire plant synthesizes large amounts of protein. The problem of fertilizer utilization to faba bean stay in the attention of many researchers (MM Gukova, Tjulina OV, 1968 Comarovschi Gh., 1973 Mlesnita V., 1986, Saghin Gh., 1996 and others). They point abundantly, the favorable effect of fertilizer utilization at this species, in many cases,

their views are different and sometimes contradictory, that is due mainly to specific environmental conditions where was experimented this species.

In this context, it experimented the influence of plant density and fertilization on seed yield production on faba bean major variety, (less researched variety) in the environmental conditions from Bucovina Obcines area.

MATERIAL AND METHOD

The researches were conducted during period 2012 – 2014 in the Agricultural Research Center of Pojorâta, on alluvial lithic soil with following agrochemical traits: pH (water) 5.1, humus content 2.9, phosphorus (P_{AL}) 45 pmm, potassium (K_{AL}) 80.5 pmm, the saturation degree with bases (V) 57.17% and nitrogen index (IN) 2.18. In a bifactorial experience of type 2 x 7 in three replication it followed the sowing density influence with two graduations (20 g.s./m² and 40 g.s./m²) and fertilization with seven graduations (unfertilized, 40N, 60P₂O₅, 40N60P₂O₅, 40N60P₂O₅60K₂O, 40t/ha manure, 40 t/ha manure + 40P₂O₅) on faba bean seed production (*Vicia faba* L. var. *major*).

In terms of climate aspect, year 2012 was the wettest with 290.8 mm on the whole year and with

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255.0 mm during the vegetation period in comparison with the multi annual average. The years 2013 and 2014 were below the multi annual average, the precipitation being more less so for the whole year and during the growing season, with values between 33.7 mm and 104.0 mm. In terms of heat, in all the experimental years, the temperatures were above the multi annual average both the full year and the vegetation period with values between 0,5°C și 2,3°C (table 1).

RESULTS AND DISCUSSIONS

1. Influence of sowing density on grain yield averaged over agrofunds.

The analysis of average data for the three research years, result that plant density per unit of area, is an important factor in increasing of grain production. The highest production was achieved at sowing density on 40 germinable seeds/m². Compared with 20 germinable seeds/m², taken as standard 40 g.s./m² achieved an output of 3537 kg/ha, the production increases being very significant of 801 kg/ha (29% (table 2).

2. Influence of mineral and organic fertilizers on faba bean grain production in averaged on densities.

In average on sowing densities, the application of fertilizers with nitrogen and unilaterally phosphorus in doses on 40 kg/ha and 60 kg/ha a.s. the production increases compared to the unfertilized variant were insignificant 341 kg/ha and 363 kg/ha respectively. Through their

combined administration of the same dose, the production increases was significantly distinct on 717 kg/ha and 28% respectively. The combination of nitrogen and phosphorus with a dose of 60K₂O kg/ha, the production increases was low and insignificant on 88 kg/ha. The manure, well fermented, achieved the highest production. Thus, the dose of manure on 40 t/ha has achieved a production on 3504 kg grain/ha, the production increases in comparison with standard is very significant on 972 kg/ha, 39% respectively. The combination of manure with a dose on 40 kg/ha P₂O₅, the achieved production increases being insignificant on 8 kg/ha and 1% respectively. (table 3).

3. Sowing density and fertilizer influence on faba bean grain production.

The density of 40 g.s./m², achieved higher yields at density on 20 g.s. / m² in all fertilizer variants, the production increases being very significant, between 27 and 78%. The highest yields were achieved in variants fertilized with NPK and manure. By applying of manure in dose of 40 t/ha, the sowing density on 40 g.s./ha achieved the highest production on 3978 kg/ha, the production increases being very significant on 1742 kg/ha, 78% respectively, in comparison with sowing density on 20 g.s./m², unfertilized taken as standard. By adding of the phosphorus (40 kg/ha), at manure, the achieved production increases was insignificant (table 4).

Table 1

The precipitation and temperature regime in years 2012-2014

Specification	Precipitation (mm)				Medium temperatures (°C)			
	Annuals	During vegetation period	Deviations from normal		Annuals	During vegetation period	Deviations from normal	
			Annual	During vegetation period			Annual	During vegetation period
2012	877,6	669,4	290,8	255,0	8,3	16,4	0,5	1,4
2013	553,1	331,5	- 33,7	- 82,7	8,7	16,2	0,9	1,2
2014	482,8	356,1	-104,4	- 58,1	8,8	17,3	1,0	2,3
Multiannual average	586,8	414,2			7,8	15,0		

Table 2

Sowing density influence on seed production, averaged over agrofonds at faba bean

Sowing density (germinable seeds /m ²)	Grain yield		Diferences from standard Kg / ha	Semnification
	Kg / ha	%		
20	2736	100		
40	3537	129	801	xxx

DL 5 %
DL 1 %
DL 0,1 %

301 kg/ha
587 kg/ha
670 kg/ha

Table 3

The fertilizer influence on faba bean seed production in averaged on sowing densities

Specification	Grain yield		Diferences from standard Kg / ha	Semnification
	Kg /ha	%		
Unfertilized	2537	100		
40N	2878	113	341	
60P ₂ O ₅	2900	115	363	
40N60P ₂ O ₅	3254	128	717	xx
40N60P ₂ O ₅ 60K ₂ O	3342	132	805	xx
40 t/ha manure	3504	138	967	xxx
40 t/ha manure + 40P ₂ O ₅	3512	139	972	xxx

DL 5 % 368 kg/ha
 DL 1 % 509 kg/ha
 DL 0,1 % 811 kg/ha

Table 4

Thy sowing density and fertilization influence on faba bean seed yield (average of 2012-2014)

Sowing density b.g./m ²	Fertilization	Grain yield		Diferences from standard Kg / ha	Semnification
		Kg/ha	%		
20	Unfertilized	2236	100		
	40N	2575	115	339	
	60P ₂ O ₅	2624	117	388	
	40N60P ₂ O ₅	2780	124	544	x
	40N60P ₂ O ₅ 60K ₂ O ₅	2868	128	632	xx
	40t/ha manure	3031	135	795	xx
	40t/ha manure + 40P ₂ O ₅	3036	136	800	xx
40	Unfertilized	2838	127	602	xx
	40N	3181	142	945	xxx
	60P ₂ O ₅	3236	144	1000	xxx
	40N60P ₂ O ₅	3727	166	1491	xxx
	40N60P ₂ O ₅ 60K ₂ O ₅	3816	170	1580	xxx
	40t/ha manure	3978	178	1742	xxx
	40t/ha manure + 40P ₂ O ₅	3983	178	1747	xxx

DL 5 % 390 kg/ha
 DL 1 % 625 kg/ha
 DL 0,1 % 896 kg/ha

CONCLUSIONS

The obtained results referring to sowing density, emphasize that the *Vicia faba var. major* in the environmental conditions of the mountain area from Bucovina Obcines the most effective density is 40 g.s. / m², which could achieve in the good years, seed yield of 4000 kg/ha.

The nitrogen and phosphorus fertilizers unilateral applied in doses of 40 and 60 kg/ha active substance, proved less effective in the achievement of grain yield, the achieved production increases being small and insignificant.

The combined administration of fertilizers with nitrogen and phosphorus in dose of 40N60P₂O₅ has led to a production increases

significantly distinct on 717 kg/ha. By adding of potassium (60 kg/ha) in this variant, not significant increases production were obtained.

In this area the manure represent, an important means of faba bean seed production increasing. By applying of manure in dose of 40 t/ha and density on 40 g.s./m² was achieved a production on 3983 kg/ha. The application of 40P₂O₅ in combination with manure has not proven to be effective.

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