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THE INFLUENCE OF FERTILIZATION RECIPES UPON SEED PRODUCTION OF MADARASENI CLIMBING BEAN VARIETY

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Abstract

The investigations were conducted at SCDL Iernut.. The experience has included 11 fertilization types based on nitrogen, phosphorus and potassium (N, P_2O_5 and K_2O), in four repetitions. The spread fertilizers was made gradually, in three main points: 1. In autumn was applied the whole dose of P_2O_5 from superphosphate; 2. Before sowing, moment in which was administered 1/2 N (nitrogen) and 1/2 K (kalium) doses; 3. During the growing season, in the development plant stage of the climbing bean "early flowering', was applied 1/2 N (nitrogen) and 1/2 K (potassium) doses. From the comparison of the yields productions as the average achieved over the three-year study of the experimental variants, both toward the witness V1 as well as against the average of 11 variants revealed that the best option was V_4 ($N/P_2O_5/K_2O$ -100/150/150) variant.

Key words: *climbing beans, fertilization recipes, seed.*

INTRODUCTION

Ensuring the environmental conditions specific to each cultivar determines the achievement of cultivars production at the full potential. Both temperature and humidity conditions and cultivar specific nutrients are the main factors in their productions (Heitz A.K., 2013).

In this paper are presented the results of researches on the influence of some fertilizer recipes (NPK) of Madaraseni climbing bean variety under the environmental conditions of SCDL Iernut.

MATERIALS AND METHODS

Researches has been carried out in the period of 2010-2012 year on Madaraseni climbing bean variety (Figure 1,2,3), created at SCDL Iernut.

It was used as a biological material – pre-basic seed.

The purpose of the experiments was to force the phonotypical expression of genetic potential regarding the capacity of seeds production of Madaraseni climbing bean by using the best recipes of chemical fertilizers (NPK).

Experience has encompassed 11 variants ($N/P_2O_5/K_2O$):V_1-0/0/0, V_2-0/150/150, V_3-50/150/150, V_4-100/150/150, V_5-200/150/150, V_6-100/0/150, V_7-100/75/150, V_8-100/300/150, V_9-100/150/0, V_{10}-100/150/75, V_{11}-100/150/300; in 4 repetitions, where V_1-the unfertilized variant was used as control group (Table 1, Figure 4).

Figure 1. Madaraseni variety-plants

Figure 2. Madaraseni variety – pods and flowers

Figure 3. Madaraseni variety-seeds

Table 1. Experimental variants

The variant	The applied fertilizer dose (kg s.a./ha)		
	N	P_2O_5	K_2O
V_1	0	0	0
V_2	0	150	150
V_3	50	150	150
V_4	100	150	150
V_5	200	150	150
V_6	100	0	150
V_7	100	75	150
V_8	100	300	150
V_9	100	150	0
V_{10}	100	150	75
V_{11}	100	150	300

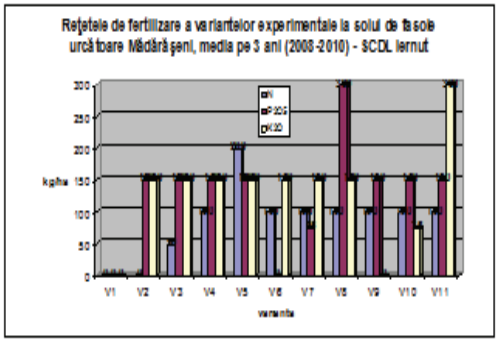

Figure 4. Fertilization prescriptions of the experimental variants of Madaraseni climbing bean, the average (2010-2012) – SCDL Iernut

The setting of the experience-in superposed blocks, randomized, four repetitions (Ceapoiu, 1968) with tape on all the edges of experience (Figure 5).

R4: $V_3, V_4, V_5, V_6, V_7, V_8, V_9, V_{10}, V_{11}, V_1, V_2$
R3: $V_9, V_{10}, V_{11}, V_1, V_2, V_3, V_4, V_5, V_6, V_7, V_8$
R2: $V_6, V_7, V_8, V_9, V_{10}, V_{11}, V_1, V_2, V_3, V_4, V_5$
R1: $V_1, V_2, V_3, V_4, V_5, V_6, V_7, V_8, V_9, V_{10}, V_{11}$

Figure 5. Arranging experimental variants

Method of working

Management of fertilizer was made gradually, in three main points:

1. In fall was applied, on variants, the entire dose of P_2O_5 from superphosphate;
2. At the preparation of the seedbed for seeding, at which time was administered the dose of 1/2 N (nitrogen) and 1/2 K (potassium);
3. During the vegetation period, in the development phase-*'starting blooming'*-of the climbing bean plant was applied the dose of 1/2 N (nitrogen) and 1/2 K (potassium).

The cultivation technology

Setting up experience has been carried out in the second decade of May, at the time when the ground was not recorded temperature decreases below the 8-10°C at the depth of sowing.

The location of the experience

The experience has been carried out on the ground with medium texture, with a neutral PH slightly acidic (pH 6.5-7.0). The land preparation began on fall through a furrow of 22-24 cm deepness and through the fertilizers' incorporation (superphosphate) from the base fertilization. On spring, before sowing, was made the soil mobilization, herbicide, the application of experimental variants, fertilizing with half from the total dose of nitrogen and potassium on the experimental variants. The experience was encased after the hoeing vegetables, after the planting scheme: 80cm between rows and 35 cm between plants/row (Figure 6).

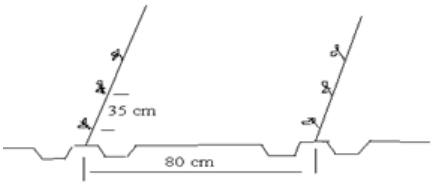

Figure 6. Sowing chart (scheme)

Before sowing, the seed was treated with Nitragin-beans.

During the growing season were made 2 mechanical hoeing with the growers followed by the manual hoeing on row (for three times).

Fertilization from the vegetation period was carried out at the *'early blooming'* time with the second half of the nitrogen and potassium fertilizers.

During the growing season have been made phenotypically observations and biological purifications by which the untypical plants have been removed, damaged by disease or pests with mechanical blows from different sources. Harvesting was performed in the physiological maturity stage, gradually, on experimental variants.

RESULTS AND DISCUSSIONS

After extracting and selecting seeds manually, on variants, the quantity of produced seeds in each variant has been weighed separately. The experimental results (Table 2, Figure 7) for the production of seed were statistically processed.

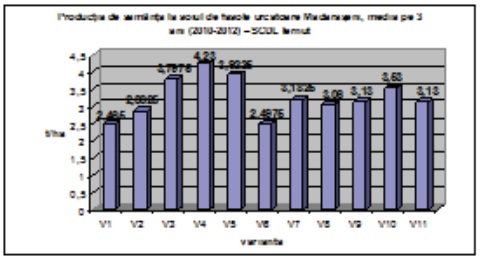

Figure 7. Seeds production of the Madaraseni climbing beans, the average on 3 years (2010-2012)-SCDL Iernut

In comparative culture organized on variants in four repetitions have been calculated the seed production/ha (Table 2) by which was established the fertilizers recipes influence on seed production per unit area by using the signification of statistical differences (Table 3, 4).

Table 2. Bean seeds′ production (t/ha) of Madaraseni variety (2010-2012), on variants and repetitions – SCDL Iernut

Variant	R1	R2	R3	R4	V	mean
V1	2,43	2,5	2,43	2,5	9,86	2,465
V2	2,7	3,06	2,83	2,86	11,45	2,8625
V3	3,73	3,83	3,93	3,7	15,19	3,7975
V4	4,3	4,16	4,13	4,33	16,92	4,23
V5	3,8	3,86	3,93	4,1	15,69	3,9225
V6	2,6	2,46	2,53	2,4	9,99	2,4975
V7	3,1	3,3	3,2	3,13	12,73	3,1825
V8	2,96	2,96	3,06	3,26	12,24	3,06
V9	3,06	3,2	3,06	3,2	12,52	3,13
V10	3,46	3,6	3,5	3,56	14,12	3,53
V11	3,16	3,1	3,03	3,23	12,52	3,13

Dispersional analysis (Ceapoiu N., 1968) has been determined by indicators relating the sum of squared deviations for: total (SP_T), rehearsals (SP_R), versions (SP_V), error (SP_E) and the degrees of their freedom (GL) (Table 3).

Table 3. Dispersional analysis (2010-2012)

Variability cause	SP	GL	s^2	Testul F
TOTAL	13,1139	43		
REPETITIONS	0,05022	3		
VARIANTS	12,774	10	1,277	130,64 (2.16; 2.98)
ERRORS	0,293	30	0,009	

Because the calculated value 'F' is greater than the theoretical value of 'F' indicates that between variants exists differences significant distinctly or very significantly, as it continues the statistically calculation for the interpretation of the obtained results.

Table 4. Influenţa reţetelor de îngrăşămintelor chimice asupra producţiei de sămânţă/ha la soiul de fasole urcătoare Mădărăşeni, media pe 3 ani (2010-2012) – SCDL Iernut Influence of chemical fertilizer recipes on seed production/ha to the Mădărăşeni climbing bean variety, the average on 3 years (2010-2012) – SCDL Iernut

Var.	Yield (t/ha)	%		Diff.	Signif	Diff.	Signif
		$x_{.med}$	Mt	($x_{.med}$)		(Mt)	
$x_{.med}$	3,25	100	132	0	Mt	0,78	**
V_1 – Mt.	2,46	75,8	100	-0,78	00	0	Mt
V_2	2,86	88,0	116	-0,38	-	0,39	-
V_3	3,79	116	154	0,54	*	1,33	***
V_4	4,23	130	171	0,98	***	1,76	***
V_5	3,92	120	159	0,67	**	1,45	***
V_6	2,49	76,8	101	-0,75	00	0,03	-
V_7	3,18	97,9	129	-0,06	-	0,71	**
V_8	3,06	94,1	124	-0,19	-	0,59	*
V_9	3,13	96,3	127	-0,12	-	0,66	**
V_{10}	3,53	108	143	0,28	-	1,06	***
V_{11}	3,13	96,3	127	-0,12	-	0,66	**

$s_d = 0,221$; $t_{5\%} = 2.04$; $t_{1\%} = 2.75$; $t_{0.1\%} = 3.65$
$DL_{5\%} = 0,221 \times 2.04 = 0,450$
$DL_{1\%} = 0,221 \times 2.75 = 0,607$
$DL_{0.1\%} = 0,221 \times 3.65 = 0,806$

From the statistic analysis of the results, as average on three years, concerning the significance of the differences against the variants average (Table 4), have been resulting:
-V_4 has recorded a difference very significant,
-V_5 has recorded a difference distinctly significant,
-V_3 has recorded a significantly difference,

-V_5 has recorded a difference distinctly significant,
-V_1 and V_6 have recorded a difference distinctly negative significant.
From the statistic analysis of the results, as average on three years, concerning the significance of the differences against the V_1-Mt (Table 4) witness variant have resulted:
-V_3,V_4,V_5,V_{10} have recorded a difference very significantly positive towards V_1 –Mt variant;
-x_{med}, V_7, V_9, V_{11} have recorded a difference distinctly positive significant towards V_1 –Mt variant;
-V_8 has recorded a difference significantly positive towards V_1 –Mt variant;
-V_2 and V_6 have recorded a difference insignificant positive towards the control.

CONCLUSIONS

The experimental results, as average on three years of study, showed that:

-V_4 variant-100/150/150 has recorded a difference very significantly positive both from the V_1-0/0/0 witness variant and from the average of the variants, from which results that V_4 represents the best recipe of fertilization.

-Increasing the dose of nitrogen is justified only up to 100 kg/ha, and the doses of phosphorus and potassium are justified only up to 150 kg/ha.

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