PRODUCTION RESULTS AN ASSORTMENT OF SOME LOCAL POPULATIONS OF RUNNER BEAN (*PHASEOLUS COCCINEUS* L.)

REZULTATE DE PRODUCŢIE ALE UNUI SORTIMENT DE POPULAŢII LOCALE DE FASOLE MARE (*PHASEOLUS COCCINEUS* L.)

MUNTEANU N.[1], STOLERU V.[1], AMBĂRUŞ Silvica[2], STOLERU Carmen[1]

[1]University of Agricultural Sciences and Veterinary Medicine, Iaşi, Romania

[2]Station for Vegetable Research and Development Bacău, Romania

Abstract. *Seven local populations of runner bean of white seeds were studied in the environmental conditions from Iassy county. The local populations showed a large variability regarding vigurosity, size, seed shape etc. The highest yields were obtained by the local populations Coccineus 5 (3097 kg/ha), Coccineus 2 (2823 kg/ha) and Coccineus 9 (2714 kg/ha).*

Key words: production, assortment, population of runner bean

Rezumat. *Şapte populaţii locale de fasole mare, cu seminţele de culoare albă, au fost studiate în condiţiile de cadru natural ale judeţului Iaşi. Populaţiile locale au prezentat o mare variabilitate în ce priveşte vigoarea plantelor, dimensiunea, forma seminţelor etc. Cele mai ridicate producţii s-au înregistrat la populaţiile Coccineus 5 (3097 kg/ha), Coccineus 2 (2823 kg/ha) şi Coccineus 9 (2714 kg/ha).*

Cuvinte cheie: productie, sortiment, populatii de fasole mare

INTRODUCTION

Runner bean (*Phaseolus coccineus* L.) is a species well known in our country, but on areas relatively small, being met especially into population gardens from rural area. The plant is grown especially for its dried or green grains. The forms cultivated for pods are less known.

The species is original from South America, being brought at the same time with common bean (*Phaseolus vulgaris* L.), without making a net distinction between those two species. In Europe it is known since $17_{th} - 18_{th}$ century and in our country since $18_{th} - 19_{th}$ century (Munteanu, 1985). In Romania are known exclusively climbing forms.

Runner bean found favourable conditions for growing and this fact was demonstrated by its in all country areas. Its alimentary and ornamental utilities contributed to a good knowledge by the countryside communities. Despite of all these aspects, the species did not imposed as a species with an economical importance, probably because of the following factors: low attractiveness for

climbing forms of bean, less suitable for mechanization, the lack of an ameliorated assortment (being cultivated only local populations) (Kaloo, 1995 Salinas, 1988). variable yields from one year to another (depending on meteorological conditions), the lack of a modern or/and standard growing technology and others.

The lack of systematized (scientific) knowledge about biology and ecology of the plant in the specific conditions from our country was also an element that had a contribution to the reduced "progress" of this species.

Previous studies (Munteanu, 2006, Munteanu, 2007, Popa Diana, 2006) underlined the large diversity of the existent populations in the collection of University of Agricultural Sciences and Veterinary Medicine Iasi from different perspectives: morphological, physiological and agro productive. The yield is considered to be a determining factor for the promotion of a new cultivar. Therefore, our research aimed to evaluate yield capacity of some valuable local populations.

In order to accomplish the proposed aim, some objectives have been settled: (O_1) – general characterization of studied populations and (O_2) – comparative evaluation of dried beans production for these local populations.

MATERIAL AND METHOD

The research was carried out in the experimental field of Faculty of Horticulture, during 2008-2009. The experiences were settled on an average leached chernozem (cambic) with an average supply of nutritive elements, 3,8% organic matter and an pH of 5,8.

Experimental variants consisted in seven local populations of white seeds (table 1), considered to be as "perspective" forms from the productivity point of view (based on the evaluation made in the collection).

Table 1

Experimental variants

Variant		Source (county/country)	Reference data: flowers and seeds colour
no.	specification		
1.	Coccineus 1	Great Britain	White flowers, white seeds
2.	Coccineus 2	Great Britain	White flowers, white seeds
3.	Coccineus 3	Galaţi	White flowers, white seeds
4.	Coccineus 4	Bacău	White flowers, white seeds
5.	Coccineus 5	Vaslui	White flowers, white seeds
6.	Coccineus 9	Bacău	White flowers, white seeds
7.	Coccineus 10	Iaşi	White flowers, white seeds

The experience was settled in a experimental plot of randomized blocks with three replicants and the size of each variant from repetition being of 8 m^2 (1,60 m x 5,00 m). The crop was established by direct sowing, during 3^{rd} –10^{th} of May, depending on meteorological conditions of experimental years. The sowing was accomplished in nests, each of them with three seeds at 50 cm, on equidistant rows at 80 cm, resulting a density of 25 000 nests/ha (75 000 plants/ha. In each plot – variant from the replicants 20 nests (60 plants) were placed.

The plants were tied with synthetic strings as in figure 1 (Munteanu, 1985) on an individual trellis for every row.

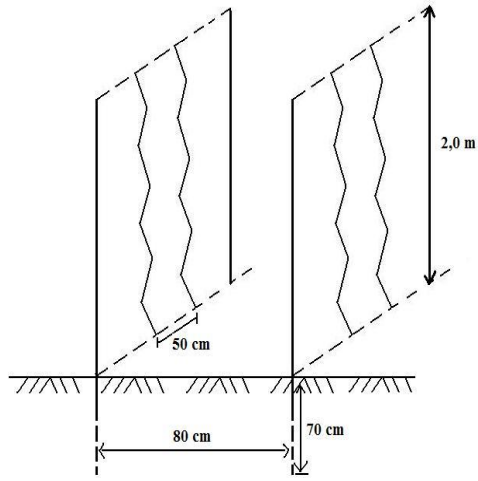

Fig.1. Stringing the plants of runner bean

During fertilization period were applied common care operations: 3-4 annual hoeing, phase fertilization with almost 300 kg of complex chemical fertilizers (NPK), drip irrigation once a week, treatments to control bean's ladybug (three times at two weeks during blooming period).

During vegetation period, some observations and biometric determinations were accomplished regarding the main morphological, physiological and yields characteristics. Experimental data regarding the yield were statistically processed by using analysis of variance and yield differences were appreciated by using limited significant differences (LSD) based on Student (t) test (Saulescu, 1967).

RESULTS AND DISCUSSIONS

General, morphological and physiological characterization of the studied assortment is presented in table 2.

In accordance with data presented above, it can be noticed a variation of morphological characters into those seven populations taken for this study. Comparatively, physiological characters presented a relatively restrained variability; this aspect could be determined of high temperatures which made uniform the behaviour of the populations.

Table 2

Morpho-physiological characterization of the assortment from comparative crop (average data, 2008-2009)

Variant	Morphological characters								Physiological characters (days no.)				
	no.of ramifications	leaves colour	vigour	Flower colour	pod size (L/l) (cm)	no.of see in pod	seed size (mm)	seed colour	Sowing rising	rising-first leaf with three lobes	rising-first flowers	rising-first pods	rising-the end of vegetation
C_1	3-4	dark green	big	white	22/1,7	5-7	22	white	7-10	7	35	71	120-125
C_2	4-7	dark green	big	white	18/1,9	4-6	2	white	7-10	8	35	66	120-125
C_3	3-4	green	big	white	11/1,9	2-3	17	white	7-10	3	34	74	120-125
C_4	3-4	green	big	white	12/1,8	3-4	18	white	7-10	3	34	74	120-125
C_5	2-3	dark green	big	white	11/1,9	3-4	19	white	7-10	3	35	73	120-125
C_9	2-3	green	mean	white	12/1,8	2-4	18	white	7-10	4	35	70	120-125
C_{10}	2-3	green	mean	white	10/1,7	2-3	20	white	7-10	4	33	70	120-125

Referring to the dried seeds/beans production, this is presented for each experimental year and as an average for two years of research.

Table 3

Synthesis data regarding seeds yield

Variant		Dried beans quantity (kg/ha)		
no.	**specification**	**2008**	**2009**	**average**
1.	Coccineus 1	2902	2412	2657
2.	Coccineus 2	3006	2639	2823
3.	Coccineus 3	1837	1780	1809
4.	Coccineus4	1612	1561	1587
5.	Coccineus 5	3152	3041	3097
6.	Coccineus 9	2790	2637	2714
7.	Coccineus10	2489	2260	2375
Experience average *x*		2541	2332	2437

According to table 3, total yield of dried beans varied in large limits, being of 1561 – 3152 kg/ha, during those two experimental years with an average of experience of 2437 kg/ha.

Table 4

Comparative analysis of data production (average dates 2008-2009)

Variant		Yield		Differences face to *x*	Differences significance
no.	**specification**	**kg/ha**	**% face to *x***		
5	Coccineus 5	3097	127	+660	xxx
2	Coccineus 2	2823	116	+386	xx
6	Coccineus 9	2714	111	+277	x
1	Coccineus 1	2657	109	+220	-
Experience average *x*		**2437**	100	0	
7	Coccineus10	2375	97	-62	-
3	Coccineus 3	1809	74	-628	000
4	Coccineus 4	1587	65	-850	000

LSD 5% = 249 kg/ha LSD 1% = 382 kg/ha LSD 0,1% = 517 kg/ha

As it can be noticed in table 4, the highest yield registered in the case of Coccineus 5 population (3097 kg/ha) with a very significant positive difference toward the experimental mean (2437 kg/ha). In the same time, the lowest value registered at Coccineus C_4 (1587 kg/ha), with very significant negative differences face to the experimental mean. Growth face to experimental mean also registered at C_2, C_9, C_1, populations, while inferior yields being obtained in the case of C_{10}, C_3, C_4 populations.

CONCLUSIONS

1. The dried beans yield (over two experimental years) varied in large limits (between 1561-3152 kg/ha) into the assortment taken for study.

2. For both years, taken as average, the highest yield was accomplished at Coccineus 5 local population with an multiannual average of 3097 kg/ha. Coccineus 5 obtained in all yield years results that framed between 3041-3152 kg/ha with very significant positive differences than experimental average.

3**.** Comparing with Coccineus 5 population, during experimental period, Coccineus 2, Coccineus 9 and Coccineus 1 populations assured yields with positive differences than average while Coccineus 3, Coccineus 4 and Coccineus 10 populations registered yields with negative differences than average.

Acknowledgements.

This paper was financial supported by Ministry of Agriculture and Rural Development, Sectorial Program 321 (Project nr. 355/2006).

REFERENCES

1. **Kaloo G. S.,** 1995 – *Runner bean - Phaseolus coccineus L. in „Genetic Improvement of Vegetable Crops"* (editors Kaloo, J., Bergh, B.O.). Pergamon Press, Oxford-New-York-Seoul-Tokyo.
2. **Munteanu N.,** 1985 – *Phaseolus coccineus L. - o specie legumicolă care merită mai multă atenţie*. Producţia vegetală Horticultura, nr. 4, Bucureşti.
3. **Munteanu N.,** 2006 – *Evaluarea biodiversităţii specie Phaseolus coccineus L. (fasole mare) în zona de nord-est a României*. Lucrări ştiinţifice, seria Horticultură, USAMV Iaşi.
4. **Munteanu N., Popa Lorena–Diana, Stoleru V.,** 2007 – *Valoarea agrobiologică a unor populaţii de fasole mare (Phaseolus coccineus L.)*. Lucrări ştiinţifice, seria Horticultură, anul L (50), USAMV Iaşi.
5. **Popa Lorena – Diana, Stan C., Stoleru Carmen,** 2006 – *Consideraţii privind importanţa culturii de fasole mare (Phaseolus coccineus L.)*. Lucrările simpozionului ştiinţific studenţesc, seria Horticultură, USAMV Iaşi.
6. **Salinas A. D.,** 1988 – *Variation, taxonomy domestication and germoplasm potentialities in Phaseolus coccineus L. in Genetic Resources of Phaseolus Beans* (edited by Gepts, P.). Kluver academic Publishers, Dordrecht/Boston/London.
7. **Săulescu N.A., Săulescu N.N.,** 1967 – *Câmpul de experienţe*. Editura Agro-Silvică, Bucureşti.