

RESEARCH CONCERNING THE MAIN CHARACTERISTICS OF SOME LOCAL BEAN POPULATION FROM BUZĂU VEGETABLE AREA

STUDIUL PRINCIPALELOR CARACTERE ALE UNOR POPULAȚII LOCALE DE FASOLE DIN BAZINUL LEGUMICOL BUZĂU

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Abstract. *The study is part of a conservation and utilization program of germplasm sources at common bean (*Phaseolus vulgaris* L. convar. nanus) from traditional vegetable areas in Romania. The research were organized in 2010 – 2011 at V.R.D.S. Buzău, using a collection of fourteen local populations from Buzău vegetable area having the purpose to mark out the main morphological and physiological characteristics, and also agro productive. The results obtained were compared to a control variety – Ioana. Thus, was dignified a great variability of the studied cultivars, and also the productive superiority of two local populations (B_z 11 and B_z 40) that surpasses with over 10% the control variant.*

Key words: breeding, germplasm collection, biodiversity, *Phaseolus vulgaris* L. convar. nanus.

Rezumat. *Studiul face parte dintr-un program de conservare și valorificare a resurselor de germoplasmă la fasolea comună de grădină (*Phaseolus vulgaris* L. convar. nanus) din unele bazine legumicole tradiționale din România. Cercetările au fost organizate în perioada 2010 – 2011, la Stațiunea de Cercetare și Dezvoltare Legumicolă (S.C.D.L.) Buzău, în cadrul unei colecții de paisprezece populații locale din bazinul legumicol Buzău, cu scopul de a pune în evidență principalele caracteristici morfologice, fiziologice agroproductive. Rezultatele obținute au fost comparate cu un soi martor – Ioana. A fost pusă în evidență largă variabilitatea a cultivarelor studiate, precum și superioritatea productivă a două populații locale (B_z 11 și B_z 40) care depășesc cu peste 10% martorul.*

Cuvinte cheie: ameliorare, colecție de germoplasă, biodiversitate, *Phaseolus vulgaris* L. convar. nanus.

INTRODUCTION

Local bean population are in a great number in the traditional vegetable area, being kept among time by the cultivators in their own vegetable gardens.

In 1932, I. M. Rădulescu obtains 3000 elites from 800 initial types of bean collected from Moldova area (Rădulescu, 1940).

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Buzău vegetable area known in our country for the great number of vegetable local population, including bean. In these circumstances the Breeding Laboratory from Vegetable Research and Development Station (V.R.D.S.) Buzău has as a main objective the valuation of this biological treasure through creating new varieties more productive and qualitative superior than the existent ones.

The first step in order to create a breeding program is collecting the biological material which has the genes that can offer the wanted characteristics to the new cultivar (Munteanu, 2008).

The number of the garden bean varieties (*Phaseolus vulgaris* L. convar. *nanus*) inscribed in the „Official catalogue of the culture plants varieties from România in 2012” is 12, in case of the yellow pod variety, and 9, in case of the green pod varieties. These varieties are kept either in stations or research institutes (10 varieties with yellow pod and 6 varieties with green pod), or commercial societies (2 varieties with yellow pod and 3 varieties with green pod).

The inland genetic patrimony is menaced by the nowadays decrease tendency of the varieties homologation and maintenance made by the national research institutes in favor of the national or foreign commercial societies. Therefore, our activity concerning collecting and using local populations as an initial breeding material, concurs in order to save the inland genetic patrimony and as well concurs to biodiversity conservation at these species. Similar actions were made in institutes and research station for horticulture and as well in profile universities (Munteanu, 1985).

Since 2010, at V.R.D.S. Buzău developed activities of enriching the germplasm bean collection through collecting the local populations from Buzău vegetable area and as well from the station’s influence area.

The initial descriptions of the collected biological material were frequently brief. The discussions with the cultivators had not given details about the culture compartment of the purchased biotypes. Thereby, the proveniences were numbered and there was added the symbol of the origin locality. In just a few cases we found the names used in the past (Munteanu, 1994; Rădulescu, 1940).

MATERIAL AND METHOD

The study started with the procurement of the biological material. First, there was made an initial stocktaking of the biological material by making the initial observation papers. There were in view the following aspects:

- provenience (locality and name – if there was possible),
- initial description received from the supplier of the biological material,
- main characteristics of the seed.

There were determined the main characteristics of the seeds: weight (g), length (cm), width (cm), thickness (cm), shape and color.

Nowadays, the bean collection detains over 50 de provenances, among which 14 manifested phenotypical stability and valuable characteristics, being comparatively studied with *Ioana* cultivar.

The experimental variants were the following:

- **V_{1Mt}** – *Ioana* variety, control variant;
- **V₂** – local population B₂ 2;

- V₃ – local population B_z 6;
- V₄ – local population B_z 11;
- V₅ – local population B_z 12;
- V₆ – local population B_z 13;
- V₇ – local population B_z 14;
- V₈ – local population B_z 21;
- V₉ – local population B_z 36;
- V₁₀ – local population B_z 40;
- V₁₁ – local population B_z 41;
- V₁₂ – local population B_z 42;
- V₁₃ – local population B_z 46;
- V₁₄ – local population B_z 48;
- V₁₅ – local population B_z 49.

The biological material was cultivated in open field, according to the technology recommended by the specialty literature (Ruști, 2008). During the experiment were made many mensurations according to the U.P.O.V. guide, in order to determine distinction, uniformity and stability of the bean plants (TG 12/9). In order to establish the intensity or the gradation of different characteristics was consulted the *Color scales for identification characters of common bean* (Genchev, 2005).

The experiment was organized according to the randomized blocks method with 3 repetitions and there were made mensurations in order to determine the variability of the main yield characteristics.

RESULTS AND DISCUSSIONS

The color of the seed represents the morphological character that detains the greatest variability. In what it concerns the color (fig. 1), according to the classification made by Rădulescu in 1940, there were ascertained the existences of three categories:

- three experimental variants (V_{1M6}, V₂ and V₁₀) have white seeds;
- three experimental variants (V₄, V₅ and V₆) au black seeds;
- nine experimental variants have spotty seeds.

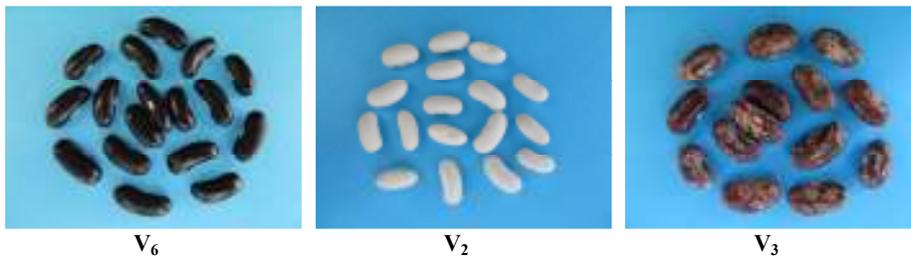


Fig. 1 - Seeds of different colors belonging to the local populations studied

In what it concerns the spotty seeds (fig. 2), taking into consideration the distribution of the colors on the tegument, we can distinguish the following categories – according to the description made by Olaru, (1982):

- zebrinus beige + violet V₃, V₇ and V₉ variants;
- punctatus at V₁₁ (beige + mauve) and V₁₂ (beige + brown) variants;

- maculatus at V₁₃ (white + red), V₁₄ (white + mauve) and V₁₅ (white+ brown) variants;
- variegatus at V₈ (brown + black) variant.



Fig. 2 - Different types of spotty seeds taken into study

During the experiment the weight of one thousand seeds (MMB) varied between 730 g (V₁₃) and 250 g (V₅), the seeds being middling and big (table 1).

The shape of the seeds taken into study varies between: oval, kidney and cylindrical.

Table 1

Main characteristics of the seeds

Variants	Shape	Color	Seeds dimensions (cm)			M.M.B (g)
			Length	Width	Thickness	
V _{1Mt}	kidney	white	1,3	0,6	0,5	270
V ₂	kidney	white	1,2	0,6	0,5	310
V ₃	cylindrical	spotty (beige + violet)	1,6	0,8	0,6	620
V ₄	oval	black	1,2	0,8	0,6	540
V ₅	cylindrical	black	1,0	0,6	0,5	250
V ₆	kidney	black	1,5	0,6	0,4	370
V ₇	cylindrical	spotty (beige + violet)	1,6	0,8	0,6	650
V ₈	cylindrical	spotty (brown +black)	1,2	0,6	0,5	320
V ₉	cylindrical	spotty (beige + violet)	1,6	0,8	0,6	630
V ₁₀	cylindrical	white	1,4	0,7	0,5	440
V ₁₁	oval	spotty (beige +mauve)	1,2	0,9	0,7	570
V ₁₂	cylindrical	spotty (beige + brown)	1,3	0,7	0,6	420
V ₁₃	cylindrical	spotty (white + red)	1,8	0,8	0,7	730
V ₁₄	cylindrical	spotty (white +mauve)	1,5	0,8	0,6	570
V ₁₅	cylindrical	spotty (white +brown)	1,4	0,7	0,5	330

The main length of the pods is 11,58 cm. The maximum value (14,38 cm) was registered at V₇ variant, and the least value (8,58 cm) was registered at V₅ variant. The variability quotient of the pods length (15,95%) shows a mean variability of this character. The main characteristics of the pods are presented in table 2.

The main width of the pods is 1,18 cm, having values within 1,6 cm lat V₄ variant and 0,9 cm at V_{1Mt} variant. The width variability is mean because the variability quotient was lower than 20% (18,49%).

The variability of the pods thickness is high because the value of the variability quotient was 20,42%, with an average equal to 0,81 cm.

In what it concerns the pods color, the number of the local populations with yellow pod (V₂, V₃, V₆, V₇, V₈, V₉ and V₁₅) was equal to the number of the populations with green pod. At the technological maturity the control variant had yellow pods.

Table 2

The main characteristics of the pods

Variants	Pods length			Pods width			Pods thickness		
	cm	differences than V _{1Mt}	% than V _{1Mt}	cm	differences than V _{1Mt}	% than V _{1Mt}	cm	differences than V _{1Mt}	% than V _{1Mt}
V _{1Mt}	12,00	0,00	100,00	0,90	0,00	100,00	0,90	0,00	100,00
V ₂	12,74	0,74	106,17	0,94	-0,04	104,44	0,82	-0,08	91,11
V ₃	12,18	0,18	101,50	1,28	-0,38	142,22	0,70	-0,20	77,78
V ₄	10,42	-1,58	86,83	1,60	-0,70	177,78	0,86	-0,04	95,56
V ₅	8,58	-3,42	71,50	0,98	-0,08	108,89	0,46	-0,44	51,11
V ₆	13,94	1,94	116,17	0,94	-0,04	104,44	0,82	-0,08	91,11
V ₇	14,38	2,38	119,79	1,35	-0,45	150,00	0,80	-0,10	88,89
V ₈	9,70	-2,30	80,83	1,00	-0,10	111,11	0,83	-0,07	92,59
V ₉	12,95	0,95	107,92	1,35	-0,45	150,00	0,98	0,08	108,33
V ₁₀	12,87	0,87	107,22	1,10	-0,20	122,22	0,90	0,00	100,00
V ₁₁	9,37	-2,63	78,06	1,40	-0,50	155,56	0,87	-0,03	96,30
V ₁₂	12,40	0,40	103,33	0,97	-0,07	107,41	1,17	0,27	129,63
V ₁₃	12,97	0,97	108,06	1,33	-0,43	148,15	0,80	-0,10	88,89
V ₁₄	9,85	-2,15	82,08	1,35	-0,45	150,00	0,55	-0,35	61,11
V ₁₅	9,43	-2,57	78,61	1,17	-0,27	129,63	0,73	-0,17	81,48

In what it concerns the threads presence, three experimental variants (V₅, V₁₃ and V₁₄) presented pods with threads even from the first development stages.

The mean weight of the pods was 6,16 g. V₉ and V₁₀ variants had pods with 8,5g weight. The control variant registered a 6,12 g weight, being very close to the average of the experiment (table 3).

Table 3

Main productivity characteristics

Variants	Mean weight/pod (g)	Mean number of seeds/pod	Number of pods/plant	Mean yield/plant (g)
V _{1Mt}	6,12	6,03	41,00	256,20
V ₂	4,62	5,80	35,00	161,70
V ₃	5,80	4,20	34,00	197,20
V ₄	7,92	4,40	42,00	332,64
V ₅	2,80	6,00	59,00	165,20
V ₆	4,70	4,60	52,67	247,53
V ₇	8,30	4,75	28,00	232,40
V ₈	4,87	5,67	17,00	82,73
V ₉	8,50	3,25	27,75	235,88
V ₁₀	8,50	5,33	40,67	345,67
V ₁₁	5,47	4,33	20,00	109,33
V ₁₂	8,17	6,00	28,00	228,67
V ₁₃	7,87	4,67	33,00	259,60
V ₁₄	4,70	3,00	59,00	277,30
V ₁₅	4,43	3,67	25,50	113,05

In what it concerns the number of pods/plant we can observe the fact that V₅ had the highest value (59), V₈ had the least value (17), while the control variant had 41 pods/plant.

The most productive variants were V₁₀ and V₄ these variants surpassed the control variant with 89,47 g and 76,44 g in what it concerns the mean yield/plant.

The mean yield/plant for V₁₄ and V₁₃ was superior to Ioana cultivar with 8,24 % and 1,33 %.

The mean yield/plant for the V₈ variant represented only 32,29 % from the control variant yield.

CONCLUSIONS

1. V₄ and V₁₀ variants remarked through characteristics superior to the control variant.

2. The three experimental variants (V₅, V₁₃ and V₁₄) which presented pods with threads since the first development stages will be recommended for berries.

3. V₃, V₇ and V₉ variants resemble even if there were procured from different locations.

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