

## PHENOTYPIC EVALUATION OF SOME VARIETIES AND LOCAL POPULATIONS OF DWARF FRENCH BEAN

### EVALUAREA FENOTIPICĂ A UNOR SOIURI ȘI POPULAȚII LOCALE DE FASOLE PENTRU PĂSTĂI CU CREȘTERE DETERMINATĂ

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**Abstract:** *The study aims to know the breeding potential of some varieties and local populations of dwarf french beans. Three varieties with green pods (Cape, Valja and Atlantic), one variety with yellow pods (Galbena de Moldova) and two local populations with pods green, collected from local growers near the city of Iași. At a preliminary multiplication of the seeds and testing of the culinary value of the pods, it was observed that the pods have a culinary value appreciated by consumers, and in the field a rather pronounced variability of some quantitative characters was externalized. Under these conditions, a field experience was carried out, with the aim of being able to evaluate the average values and the variability of the quantitative characters of the tested cultivars, possibly to be able to select some biotypes with breeding value.*

**Key words:** determined growth, garden bean, local populations, phenotypic variability, plant breeding

**Rezumat:** *Studiul vizează cunoașterea potențialului pentru ameliorare a unor soiuri și populații locale de fasole pentru păstăi cu creștere determinată. S-au analizat trei soiuri cu păstaia verde (Cape, Valja și Atlantic), un soi cu păstaia galbenă (Galbenă de Moldova) și două populații locale cu păstaia verde, colectate de la cultivatori locali din proximitatea orașului Iași. La o prealabilă înmulțire a semințelor și testare a valorii culinare a păstăilor, s-a observat că păstăile au o valoare culinară apreciată de consumatori, iar în câmp s-a exteriorizat o variabilitate destul de pronunțată a unor caractere cantitative. În aceste condiții, s-a realizat o experiență de câmp, cu scopul de a se putea evalua valorile medii și variabilitatea caracterelor cantitative ale cultivarelor testate, eventual pentru a se putea selecta unele biotipuri cu valoare ameliorativă.*

**Cuvinte cheie:** ameliorarea plantelor, creștere determinată, fasole de grădină, populații locale, variabilitate fenotipică

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## INTRODUCTION

The common bean (*Phaseolus vulgaris* L.) is one of the most valuable vegetable species, through its intake of proteins, fibers, vitamins, minerals (Savić *et al.*, 2021). As a result, the importance of the evaluation of genetic resources for breeding, especially of local populations, is highlighted by numerous recently published results for germplasm collections from Turkey (Aydın and Baloch, 2019), Italy (de Luca *et al.*, 2018), Serbia (Savić *et al.*, 2021), Bulgaria (Svetleva *et al.*, 2006), India (Jan, 2021) and more. Even if the assortment of garden beans with determined growth in Romania includes only 17 approved varieties (<https://listis.ro/>), the rich collection of the Suceava Plant Genetic Resources Bank, which totals 3289 samples ([https://svgenebank.ro/svrgbstatistics1\\_ro.asp](https://svgenebank.ro/svrgbstatistics1_ro.asp)), as well as the existence in cultivation, at the level of amateur growers, of some local populations that have not yet been evaluated, give real chances for the creation of new cultivars, which correspond to the requirements of productivity, quality, as well as those related to adaptation, earliness, disease and pest resistance.

## MATERIAL AND METHOD

The biological material was represented by six garden bean cultivars with determined growth, respectively four cultivars and two local populations. With the exception of the Galbena de Moldova (GM) variety, with yellow pods, all the others have green pods at technological maturity.

The local populations were collected from amateur growers in the area of the Iași county. Local population LA-01 has oval, yellow-colored seeds, and local population NP-01 has reniform, black-colored seeds.

The experiment was located in the experimental field of the Faculty of Agriculture, within the USV Iași, according to the method of randomized blocks, in four repetitions.

From each plot-repetition, 30 plants were retained, and the following quantitative characters were analyzed: plant height, the number of branches on the main, the number of pods per plant, the length and diameter of the pods, the number of grains per plant and in pod, grain weight per plant and in pod, as well as thousand kernels weight (TKW). Based on the obtained data, the average values of the quantitative characters and the coefficients of variability were determined.

## RESULTS AND DISCUSSIONS

From the analysis of the average values of the quantitative characters analyzed (tab. 1), for the six cultivars, it can be observed that there are quite pronounced amplitudes of variation from one cultivar to another and for all the characters studied.

The resulting coefficients of variability for these quantitative characters (tab. 2) highlight stable characters such as pod length and diameter in Valja and Atlantic cultivars and in local populations LA-01 and NP-01. The average number of seeds in the pod is associated with a low variability only in the Valja variety, while the Cape variety and the local population NP-01 show a medium variability.

Table 1

## Average values of quantitative characters

Characters	Cultivar					
	Cape	Valja	GM	Atlantic	LA-01	NP-01
Plants height (cm)	30.6	37.0	30.4	27.6	35.7	29.0
Number of main branches	3.1	3.4	3.2	2.6	2.3	2.3
Number of pods per plant	14.5	27.9	17.4	10.1	13.3	10.0
The length of the pods (cm)	11.9	10.1	9.6	12.2	9.5	10.0
The diameter of the pod (mm)	9.5	7.0	9.3	7.6	9.2	13.3
Number of seeds per plant	53.6	130.2	63.5	30.4	48.9	28.3
Seed weight per plant (g)	16.5	27.6	19.9	10.5	14.4	14.0
The number of seeds in the pod	3.5	4.6	3.2	2.8	4.0	3.6
Seed weight per pod (g)	1.1	0.9	1.0	0.9	1.2	1.6
Thousand kernels weight (TKW, g)	307.8	212.0	313.4	345.4	307.4	508.0

Table 2

## Phenotypic variability of quantitative characters (s%)

Characters	Cultivar					
	Cape	Valja	GM	Atlantic	LA-01	NP-01
Plants height (cm)	21.6	16.3	23.4	16.5	17.1	12.4
Number of main branches	22.0	27.4	23.0	23.4	20.5	24.4
Number of pods per plant	41.0	42.4	70.2	42.4	37.0	25.4
The length of the pods (cm)	13.6	6.1	14.5	9.6	7.0	6.7
The diameter of the pod (mm)	12.2	6.1	7.4	5.7	6.5	6.8
Number of seeds per plant	53.3	40.8	79.2	56.8	54.1	39.0
Seed weight per plant (g)	54.1	39.5	73.8	58.5	49.7	36.5
The number of seeds in the pod	16.5	7.5	30.7	25.4	26.4	13.0
Seed weight per pod (g)	16.3	13.6	22.5	27.9	21.8	16.4
Thousand kernels weight (TKW, g)	12.8	11.7	12.5	13.2	17.1	15.2

The other three cultivars (the varieties Galbenă de Moldova, Atlantic and the local population LA-01) stand out for high values of the coefficients of variability.

The number of pods per plant, the number of seeds per plant and the weight of seeds per plant are the characters with the highest values of the coefficients of variability, the highest values being recorded for the variety Galbenă de Moldova.

## CONCLUSIONS

1. The average values of the analyzed quantitative characters, quite different from one cultivar to another, constitute a good premise for the initiation of research programs with the aim of diversifying the assortment of beans for pods with determined growth.

2. Pod length and diameter are associated with low values of the coefficients of variability, which indicates a high genetic stability of these characters, only the Cape variety having a medium variability.

3. Further studies on pod quality, earliness, disease and pest resistance could provide more complete information on the suitability of these cultivars for initiating a breeding program of dwarf french beans.

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