

COMPARATIVE STUDY OF SOME CULTIVARS OF BROAD BEAN (*VICIA FABA* L.)

STUDIUL COMPARATIV AL UNOR CULTIVARE DE BOB DE GRĂDINĂ (*VICIA FABA* L.)

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Abstract. *The broad bean is a vegetable plant known and appreciated in the peasant households of our country, where different local populations and a limited variety of homologated cultivars are cultivated. Statistics in our country do not mention the species as being of major importance to the population, although its nutritional and agrotechnical value are well known. The aim of this paper is to conduct a study on the main biometric and agroproductivity characteristics of some broad bean cultivars. The results obtained highlight the high variability of the cultivars studied in terms of plant weight and height dynamics, the number of pods per plant, the number of seeds per pod, the number of seeds per plant, the average weight of a broad bean seed and the average weight of seeds/plant.*

Key words: cultivar, biometric characteristics, agroproductivity

Rezumat. *Bobul de grădină este o plantă legumicolă cunoscută și apreciată în gospodăriile țărănești din țara noastră, unde se cultivă diferite populații locale și o varietate restrânsă de cultivare omologate. Statisticile din țara noastră nu menționează specia ca fiind de importanță majoră pentru populație, cu toate că valoarea alimentară și agrotehnică ale acestei specii sunt binecunoscute. Scopul acestei lucrări este efectuarea unui studiu privind principalele caracteristici biometrice și de agroproductivitate ale unor cultivare de bob. Rezultatele obținute scot în evidență variabilitatea ridicată a cultivarelor studiate în ceea ce privește dinamica greutății și înălțimii plantelor, numărul de păstăi pe plantă, numărul de boabe în păstaie, numărul de boabe pe plantă, greutatea medie a unei semințe de bob, precum și greutatea medie a semințelor/plantă.*

Cuvinte cheie: cultivar, caracteristici biometrice, agroproductivitate

INTRODUCTION

The broad bean is an annual herbaceous plant with a vigorous habitus, cultivated mainly for its seeds, which are eaten green or dried. Very young pods may be used in soups or broths, and young leaves may be used in green salads

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(Stan *et al.*, 2003). The nutritional value of the broad bean is particularly high, the dried seeds containing about 24% protein, 2% fats and 50% carbohydrates (Crepon *et al.*, 2010).

Like any plant from the *Papilionaceae* family, this plant is an excellent precursor crop, because of its unique ability to fix atmospheric N₂ symbiotically which heavily depends on the sufficient populations of effective rhizobia (Lopez-Bellido *et al.*, 2006; Jensen *et al.*, 2010). It can accumulate N₂ both from the soil and the atmosphere (Rajan and Singh, 2012).

The crop is grown only in the open field, by direct sowing, the costs involved in the establishment and maintenance of the crop being relatively low, and the harvest is relatively early (Stan *et al.*, 2003).

The broad bean is a well-known and appreciated vegetable in the peasant households of our country, being very well valorized on the vegetable fields in cooler and wetter areas, where there are many local populations with great variability in plant size, as well as the size, shape and color of seeds.

In this context, the purpose of this research is to conduct a comparative study between six different cultivars of broad bean (*Vicia faba* L.) in order to determine the main biometric and agroproductivity characteristics.

MATERIALS AND METHOD

The research was carried out under the experimental conditions of the year 2019, at the Didactic Station of U.S.A.M.V. Iași, the V. Adamachi Horticultural Farm, "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine of Iași. The experiment was organized on a medium leached chernozem soil type, with a medium supply of nutrients, with 3% organic matter (Teliban *et al.*, 2020) and pH = 6.7. The meteorological conditions in the experimental period were moderately favorable for this species.

The experimental protocol provided for the organization of a single-factor experiment organized in randomized blocks, with three repetitions, in which six broad bean cultivars were studied, in terms of the main growth and agroproductivity indices.

The six broad bean cultivars were represented by four varieties cultivated in the south-eastern part of Europe (Green longpod, Karmazyn, Hangdown, Superaguadulce) and two local broad bean populations, one from the Iași area, respectively from Miroslava, and the other local population from the Republic of Moldova, respectively from Ungheni.

Growth indices, plant height and weight, were dynamically determined, every seven days, and the number of pods/plant, the number of seeds/pod, the number of seeds/plant, the weight of seeds/plant and the average weight of a seed were determined at harvest.

The experimental data was processed by appropriate statistical-mathematical methods (Jitareanu, 1999; Leonte and Simioniuc, 2018). The results were reported as means ± standard errors. The ANOVA test was used to highlight the statistical significance of the differences. Where the differences were significant, the Tukey (p < 0.05) multiple comparison test was used. The software used was SPSS v21 (IBM Corp, Armonk, NY, USA).

RESULTS AND DISCUSSIONS

The dynamics of plant weight for the six broad bean cultivars studied is shown in fig. 1. Analyzing the data on plant weight, it may be noted that the local population of Miroslava had the best start, recording an average weight of 59.0 g/plant, and the lowest value was recorded in the variety Green longpod, with an average value of 32.6 g/plant, while the average of all cultivars was 44.4 g/plant.

During the vegetation period, the cultivars recorded different growth rates. At harvest, the highest weight of plants was recorded by the local population of the Republic of Moldova (368.7 g/plant), and the lowest weight by the variety Karmezin (243.0 g/plant), while the average of all cultivars was 306.8 g/plant.

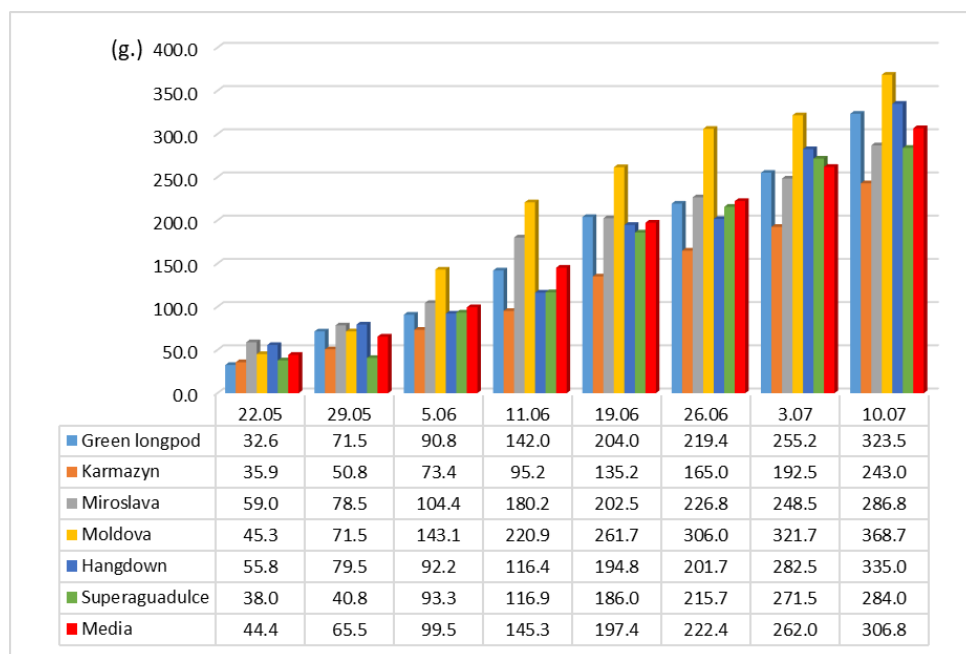


Fig. 1 Weight dynamics of broad bean plants

Analyzing the **dynamics of plant height** (fig. 2) we may note that at the first measurement there were no large differences between the six broad bean cultivars, these being highlighted during the vegetation period. The highest plant height was achieved by the Green longpod variety (119.0 cm), this being the only cultivar with higher values of plant height compared to the average value of all cultivars (106.0 cm). The other five cultivars recorded values of plant height below the experimental average, the lowest height being recorded by the Superaguadulce variety (98.3 cm).

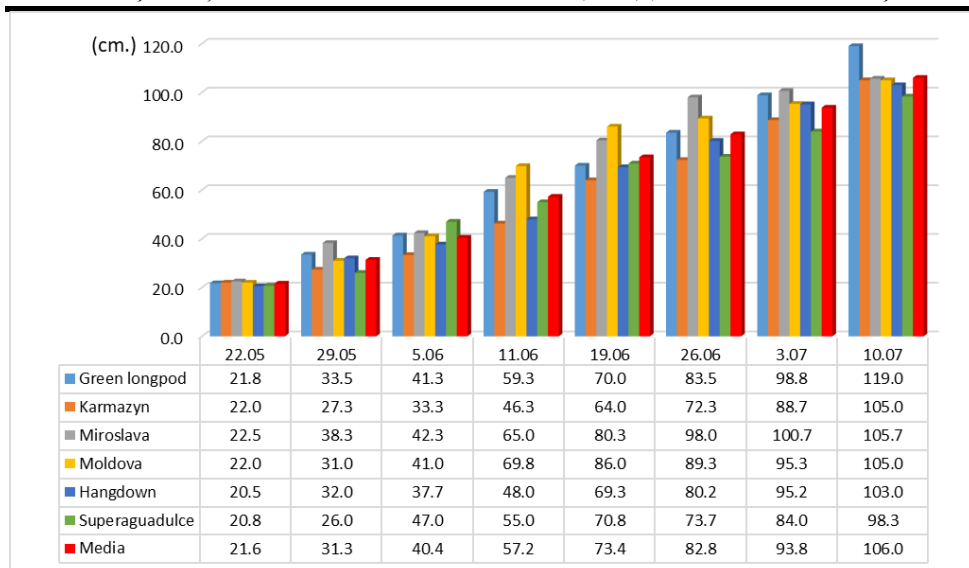


Fig. 2 Height dynamics of broad bean plants

The results obtained regarding the main productivity elements are presented in Table 1.

Table 1

The results obtained regarding the main productivity elements

No.	Cultivar	No. pods/plant	No. seeds/pod	No. seeds/plant	Average weight/seed (g.)	Seed weight/plant (g.)
1.	Green longpod	7,10 ± 0,59 c	3,44 ± 0,18 a	24,47 ± 2,28 bc	1,62 ± 0,01 b	39,50 ± 3,5 b
2.	Karmazyn	7,53 ± 0,39 bc	2,55 ± 0,12 ab	19,20 ± 1,07 cd	1,21 ± 0,01 e	23,20 ± 1,12 c
3.	Miroslava	14,67 ± 0,82 ab	2,01 ± 0,15 b	29,23 ± 0,91 ab	1,34 ± 0,01 d	39,06 ± 0,95 b
4.	Moldova	15,77 ± 1,35 a	1,88 ± 0,12 b	29,33 ± 0,84 ab	1,27 ± 0,03 de	37,11 ± 0,14 b
5.	Hangdown	7,50 ± 1,5 bc	2,19 ± 0,37 ab	15,47 ± 0,91 d	1,76 ± 0,02 a	27,21 ± 1,33 c
6.	Superaguadulce	14,10 ± 3,18 abc	2,45 ± 0,51 ab	31,33 ± 1,17 a	1,52 ± 0,01 bc	47,66 ± 1,36 a
7.	Average	11,10 ± 0,53 abc	2,43 ± 0,07 ab	24,83 ± 0,5 bc	1,47 ± 0,03 c	35,60 ± 0,76 b

The **number of pods per plant** varied between 7.1 pods/plant (Green longpod variety) and 15.77 pods/plant (local population of the Republic of Moldova), while the average value of all cultivars was 11.1 pods/plant. The local population of the Republic of Moldova registered the highest number of pods per plant with significant differences compared to the Karmazyn, Hangdown and Green longpod cultivars. The Superaguadulce cultivar, the local population from the Republic of Moldova and the local population from Miroslava achieved higher values than the experimental average.

The **number of seeds per pod** varied between 1.88 (local population from Ungheni, Republic of Moldova) and 3.44 seeds/pod (Green longpod variety),

while, on average for the six cultivars, the number of beans/pod was 2.43. The Green longpod variety recorded the highest number of beans/pod with significant differences from the local populations from Miroslava and Ungheni. The Superaguadulce, Karmazyn and Green longpod cultivars achieved higher values than the experimental average.

The **number of seeds per plant** varied between 15.47 (Hangdown variety) and 31.33 seeds/plant (Superaguadulce variety), while, on average for the six cultivars, the number of seeds/plant was 24.83. The Superaguadulce variety recorded the highest number of seeds per plant with significant differences from the Green longpod, Karmazyn and Hangdown varieties. The local populations from Miroslava and Ungheni, as well as the Superaguadulce variety, registered higher values than the experimental average.

The **average weight of a bean seed** varied between 1.21 (Karmazyn variety) and 1.76 grams/seed (Hangdown variety), while the average weight of a seed, for the six cultivars, was 1.47 grams/seed. The Hangdown variety has the largest seeds, the average weight of a seed showing significant differences compared to all the cultivars studied. Higher values of seed weight, compared to the experimental average, were recorded by the Superaguadulce, Green longpod and Hangdown varieties.

The **average weight of seeds/plant**, a defining characteristic determining the productivity, varied between 23.20 g/plant (Karmazyn variety) and 47.66 g/plant (Superaguadulce variety), while the average weight of seeds per plant, for the six cultivars studied, was 35.60 g/plant. Superaguadulce is the most productive variety, the average weight of seeds per plant showing significant differences compared to all the cultivars studied. The local populations from Miroslava and Ungheni, as well as the Green longpod and Superaguadulce varieties registered higher values of the weight of the seeds per plant, compared to the experimental average.

CONCLUSIONS

1. The cultivars studied have different growth rates, the highest plant weight and height values, at harvest, being recorded by the local population of the Republic of Moldova - 368.7 g/plant, and by the variety Green longpod respectively - 119.0 cm.

2. The highest values for the main elements of agroproductivity were recorded by the following cultivars: Superaguadulce - 47.66 g seeds/plant, Hangdown - 1.76 g/seed, Superaguadulce - 31.33 seeds/plant, Green longpod - 3.44 seeds/pod, local population of the Republic of Moldova-15.77 pods/plant.

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