VARIABILITY OF THE MAIN QUANTITATIVE CHARACTERS IN THE GARDEN PEA VARIETY *IȘALNIȚA 60* IN SANDY SOIL CONDITIONS FROM RDSPCS DĂBULENI

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Abstract

The studies were carried out in the experimental field of the Research Development Station for Plant Culture on Sands Dăbuleni in the period 2023 on the garden pea variety Isalnița 60, with the objective of maintaining varietal purity within the specific limits of the variety. Following the statistical analysis of each analyzed character, the 100 elites chosen showed medium variability and very high variability for the analyzed characters. The number of pods per plant is another quantitative character that determines the productivity of the variety, a character influenced by the environmental conditions and the applied technology. The calculation and analysis of the variability of this genotype revealed very high variability for this character (34.80%).

Key words**: **sandy soil, variability, garden peas

INTRODUCTION

Garden pea *(Pisum sativum L.)* is one of the most important favorable legume crops grown in Egypt during the winter season. The green pod and dried seeds are considered essential sources of protein and vitamins that are used for both human and animal feed. Increasing yield per unit area and pod quality could be achieved by cultivating new and high-productivity cultivars. Legumes are grown on variable areas of land in relation to climatic and pedoclimatic conditions, the agricultural specifics of different countries, consumption and commercial requirements, etc. (Dutta et al., 2022).

Pea is a nutritionally important vegetable for human food and animal feed (Ashiev et al., 2021; Kumari & Deka, 2021). Peas have been studied in relation to food benefits (Dahl et al., 2012; Kumari & Deka, 2021; Abebe, 2022), forage and crop structure (Gollner et al., 2022)., ; Powers & Thavarajah,2019). In human food, mainly the grains from varieties belonging to the garden pea are used, harvested at green maturity (as a fresh, frozen or canned vegetable), but also dried grains or certain vegetative parts (immature pods) consumed in many countries for their special taste. Peas are also an intermediate source of protein and energy, between soybean meal (approx. 45% protein) and cereal grains (wheat 59% and corn 68% starch) (Sturzu et al., 2005).

The term also refers to the seed itself, which is high in energy (starch) and protein (16% to 40%). Peas have been cultivated since Neolithic times and accompanied cereals in the emergence of agriculture in the Near East. It was a staple food in Europe and the Mediterranean basin in Antiquity and the Middle Ages. Currently, its cultivation is practiced on all five continents, especially in the temperate regions of Eurasia and North America. The agronomic importance of peas is given by the fact that it clears the land early, leaves it clean of weeds and plant debris, enriched in organic matter and biologically fixed nitrogen from the atmosphere (30-60

kg/ha), leaves the soil structured and with sufficient moisture to be plowed early and get a quality plow, being a very good precursor for most crops (except legumes, barley and orzoa) (Bîlteanu Gh. , 1998). Peas are low in calories compared to their nutritional benefits.

Thus, 100 grams of boiled peas are about 80 calories. 100 grams of peas are 7 grams of protein, 21 grams of carbohydrates and 0.3 grams of fat, of which 0.03 grams of Omega-3 and 0.11 grams of Omega-6.

Regarding vitamins and minerals, peas are very rich in vitamin K (35.68 mcg/in 100 grams of peas), A (1103.38 IU*/100 grams) and C (19.56 mg/100 grams) and contain the whole range of B vitamins, in varying amounts.

Peas contain calcium (37.19 mg/100 grams of peas), iron (2.12 mg/100 grams), potassium (373.30 mg/100 grams), phosphorus (161.17 mg) and smaller amounts of zinc , magnesium and iodine. It must be said that in 100 grams of peas there are 28% of the daily requirement of phosphorus, which is really important, and 40% of the daily requirement of vitamin K.

MATERIALS AND METHODS

The experience was located in the Research Field at RDSPCS Dăbuleni, by using the author's seed for sowing, from the production of 2022. During the vegetation period, observations were made regarding the course of the main vegetation phenophases of the plant (emergence, flowering, fruiting, technical and physiological maturity of pods), measurements and biometric determinations on plants and pods based on the selection program.

For each character studied, the following parameters were determined: arithmetic mean (x̄), standard deviation (s), coefficient of variability (s%), range of variability (k) and frequency of individuals included in the range of variability (%).

RESULTS AND DISCUSSIONS

The average temperature from March to June was 14,27ºC, being + 0,22ºC higher than the multiannual average for this period. In the pea crop the seeds start germination at temperatures of 1°C or 2°C, as the pea develops, it needs higher temperatures of about 14°C -15°C when it is in the growing period and 18°C– 20°C during the fruiting period. The absolute maximum temperature was 37.9°C, and was recorded in June, while the absolute minimum was -5,9, and was recorded in March. The amount of precipitation in the analyzed period was 220,46 mm, + 36,34 mm more than the precipitation in the multiannual monthly sum. Air humidity had values between 66,9% in May and 70,6% in June, the average of the four months being 67,95% (table 1).

Table 1. Climatic conditions recorded at RDSPCS Dabuleni in 2023

The climatic element	III	IV	V	VI	Average/Sum Minimum/maximum
Average temperatures	8	11,1	16,8	21,2	14,27
Absolute maximum	21,6	23,5	29	37,6	37,6
Absolute minimum	-5,9	0	7,4	11,4	-5,9
Precipitation (mm)	36	57,8	81,6	81,4	256,8
Rainy days	12	12	16	13	53
Humidity %	67,2	67,1	66,9	70,6	67,95
Multiannual mean temperature (1956-2023) (°C)	5,87	11,86	16,94	21,54	14,05
Precipitation multiannual monthly sum (1956-2023) (mm)	40,67	47,12	62,67	70,00	220,46

The pea finds favorable conditions for cultivation in most agricultural areas in the country, being a little pretentious to vegetation factors. The sum of temperatures (°C) in the pea crop during the vegetation period from sunrise to the physiological maturity of the pods was 1464,2°C. During the vegetation period from emergence to ripening, peas need a sum of active temperatures equal to 1350-1650°C, and for the entire vegetation period, peas need 1,350-1,800°C. The minimum temperature supported by the newly emerged plants during the main phenophases was -5,9°C, and the maximum temperature was recorded at 25,1°C, so that temperatures higher than 25°C at fruiting reduce the pod binding percentage. The amount of precipitation recorded during the vegetation period was 214,8 mm. The pea crop needs more water between flowering and pod formation. For the success of the culture, the precipitation in May and June is very important, it consumes an average of 125-140 mm of water. The maximum water consumption is recorded from the appearance of the flower bud, two weeks before flowering and until the formation of the pods, two weeks after the end of flowering. This period overlaps with the flowering-fruiting phase, being also the critical period for water. The drought and high temperatures during this period cause the formation of a small number of pods and the abortion of flowers, at the same time favoring the attack of weevils, and excess humidity prolongs flowering (table 2).

Following the statistical analysis of each character analyzed at technical maturity, the 100 selected elites presented: a very high coefficient of variability for the number of pods/plant (34.80%), high variability for the length of the pod (29.67%), total number of internodes (22.06%), stem length (29.67%), total number of internodes (22.06%), number of internodes to first flower (26.81%), pod weight (21 .98%) and green grain yield (21.16%). They showed a small variability for the characters pod width (8.49%) and pod thickness (9.14%) and a medium variability for the other characters weight of grains per pod (19.59%), number of grains in the pod (19, 33%) and pod length (17.35%).

Phenological stages	Period	∑T °C	Minimum temperature (°C)	Maximum temperature (°C)	∑ Rainfall (mm)	Number of days	Rainy days
Sunrise-Blooming	13.03-02.05.2023	522,5	-5,9	25,1	76,8	51	19
Flowering-fruited	03.05-09.05.2023	99,0	7,8	25,9	10,4	7	5
Fruitful-technological maturity	10.05-07.06.2023	522,7	7,4	29,8	94,0	29	15
Technological maturity-physiological maturity	08.06-22.06.2023	320,0	12,5	33,3	33,6	15	8
Vegetation period		1464,2	-5,9	25,1	214,8	102	47

The weight of the grains per plant is considered to be the most important character in the assessment of productivity, therefore for the maintenance (conservation) of the productive potential of the variety. The data obtained therefore refer to the case where all pods per plant are maintained, making an indirect assessment of productivity (the number of green pods per plant) (table 3).

Table 3. Variability of the main quantitative characters in the garden pea variety *Șalnița 60* at technical maturity

Nr. crt	The analyzed character	Average (x̄)	The standard deviation (s)	Coefficient of variability (s%)	Range of variability (k)	Frequency of individuals
1	Stem length (cm)	61,12	18,14	29,67	42,98 - 79,26	70
2	The total number of internodes	13,55	2,99	22,06	10,56 - 16,54	76
3	The number of internat the first flower	8,95	2,40	26,81	6,55-11,35	79
4	Number of pods per plant	7,47	2,60	34,80	4,87-10,07	85
5	Pod length (cm)	5,36	0,93	17,35	4,43-6,29	71
6	Pod width (mm)	10,01	0,85	8,49	9,16-10,86	67
7	Pod thickness (mm)	9,29	0,85	9,14	8,44-10,14	76
8	Weight of a pod (g)	4,73	1,04	21,98	3,69-5,77	64
9	Weight of grains per pod	2,96	0,58	19,59	2,41-3,54	64
10	Number of pods	5,12	0,99	19,33	4,13-6,11	90
11	Green grain yield %	63,65	13,47	21,16	50,18 - 77,12	76

Meaning S% 0-10% = little variability

10-20% = medium variability

20-30% = high variability

> 30% = very high variability

The correlation between stem length and the number of pods/plant is represented by a polynomial equation, with a distinctly significant correlation factor, and we observe that the longer the stem length, the higher the number of pods/plant (Figure 1).

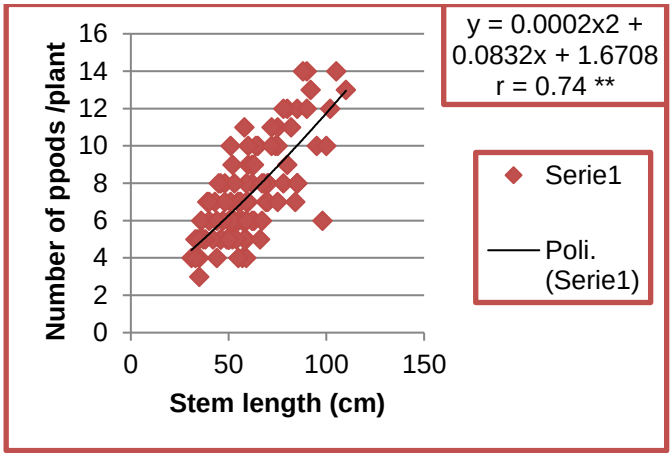

Figure 1.Correlation between stem length and number of pods/plant

The correlation between the weight of the kernels in the pod and the number of kernels in the pod is a distinctly significant correlation and proves to us that the number of kernels/pod is higher (Figure 2).

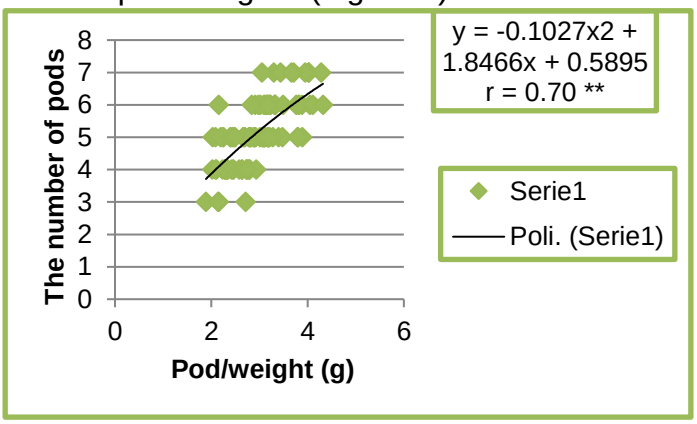

Figure 2. Correlation between pod weight and number of pods

The correlation between pod length and pod weight is represented by a polynomial equation, with a distinctly significant correlation factor, and an increase in pod length as a function of pod weight can be observed (Figure 3).

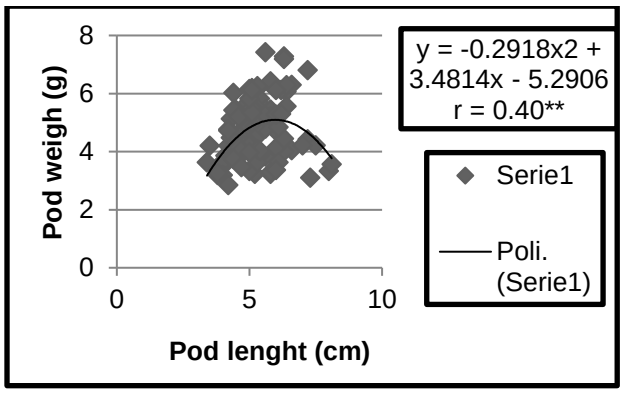

Figure 3. Correlation between pod length and pod weight

Foto pod length

Foto during the flowering period

CONCLUSIONS

The garden pea variety *Șalnița 60* showed good stability in the width and thickness of the pod, represented by the low values of the standard deviation (σ) compared to the mean and of the coefficient of variability (s%), respectively: σ=0,85 mm ; s%= 8,49-9,14 and a medium variability in most of the other characters analyzed (σ=0,58-18,1 and s%= 17,35-19,59).

The number of pods per plant presented a very high coefficient of variability (s%=34,8), this character being significantly influenced by the environmental conditions and the applied technology.

The optimum growing temperature for pea plants is in the range of 15-18°C, with maximums of up to 24°C. Values above 25-30°C recorded in the flowering-fruiting phenophase negatively influenced the production capacity of the pea crop.

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