THE INFLUENCE OF CORM SIZE ON PHENOLOGY AND ORNAMENTAL VALUE OF *GLADIOLUS BYZANTINUS*

INFLUENŢA MĂRIMII TUBEROBULBILOR ASUPRA FENOLOGIEI ŞI VALORII ORNAMENTALE LA *GLADIOLUS BYZANTINUS*

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Abstract. *The behavior in culture of the Gladiolus byzantinus species, in the ecological conditions of the NE area of Romania, has been studied for several years at the University of Agricultural Sciences and Veterinary Medicine Iaşi. In this paper we determined the way in which G. byzantinus corms influence the growth and development of plants, respectively their decorative value. The establishment of experimental crops it was made in November 2019, using corms with different mass: > 10g (V_1), 7-9 g (V_2) and <7g (V_3). Observations and determinations performed in 2020 showed that from corms with a mass > 10g (V_1) were obtained plants with the highest number of shoots, flower stems and flowers. At the variants from the smaller corms, respectively V_2 and V_3, the results were inferior, except for the height of the floral stem. From a phenological point of view, the beginning in vegetation, the formation of floral stems, the onset and duration of flowering, were to the advantage of the V_1 variant.*
Key words: corm size, ornamental performance, flowering.

Rezumat. *Comportarea în cultură a speciei Gladiolus byzantinus, în condiţiile ecologice din zona de NE a României a fost studiată de mai mulţi ani la Universitatea de Ştiinţe Agricole şi Medicină Veterinară Iaşi. În această lucrare s-a determinat modul în care tuberobulbii de G. byzantinus influenţează creşterea şi dezvoltarea plantelor, respectiv valoarea lor decorativă. Înfiinţarea culturilor experimentale s-a făcut în noiembrie 2019, folosind tuberobulbi cu masa diferită: > 10g (V_1), 7-9 g (V_2) şi < 7g (V_3). Observaţiile şi determinările efectuate în 2020 au evidenţiat faptul că din tuberobulbii cu masa > 10g (V_1) s-au obţinut plante cu cel mai mare număr de lăstari, tije florale şi flori. La variantele din tuberobulbii mai mici, respectiv V_2 şi V_3 rezultatele au fost inferioare, cu excepţia înălţimii tijei florale. Din punct de vedere fenologic, pornirea în vegetaţie, formarea tijelor florale, declanşarea şi durata înfloririi, au fost în avantajul variantei V_1.*
Cuvinte cheie: mărime tuberobulbi, valoare ornamentală, înflorire.

INTRODUCTION

The name of the genus *Gladiolus* comes from the Latin word "gladius", which means sword, refers to the shape of the leaves of all members of this

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genus, being in fact a characteristic feature of the entire family Iridaceae. Species of this genus have a corm as an underground organ. Depending on the area of origin, some species of the genus *Gladiolus* withstand negative temperatures and can overwinter in the field, in conditions of temperate continental climate, behaving like rustic geophytes (Cantor and Tolety, 2011).

Gladiolus byzantinus Mill. in Gard. Dict., ed. 8:n3 (1768). *Gladiolus communis* subsp. *byzantinus* (Mill.) A. P. Hamilton, Bot. J. Linn. Soc. 76: 358 (1978) com. Superfl (López *et al*., 2003).

G. byzantinus, native to Asia Minor, is a perennial species from the group of rustic geophytes and has as an underground organ an ovoid corm, covered with fibrous tunics. The leaves, 4-5 at number, are ensiform and can reach a height of 70 cm, with a width of 1-2.5 cm. The floral stem is erect and reaches 0.5-1 m in height; presents 5-15 flowers, brightly colored in red-purple, very beautiful, arranged unilaterally, less bilateral, often unbranched, blooming in May-June. The flowers are zygomorphic, about 5 cm long. The lower tips of the tepals have whitish pink spots, and the edge of the tepals is intense purple. The anthers and filaments of the stamens are approximately equal (0.9-1.3 cm). The fruits are dehiscent capsules with a smooth surface. The seeds are more or less flat and have two large areas (Valdés, 1987; Kerguélen and Lonchamp 1999). The number of chromosomes is 2n = 90, (Bamfoed, 1935). It tolerates light shadows in the afternoon, but does not withstand strong winds. It adapts very easily to all types of soil, provided that they are kept permanently moist. The plant is propagated by corms or by self-seeding. This species is mainly present in the western Mediterranean basin, southern Spain and northern Africa (Morocco, Algeria and Tunisia), Italy (Sicily), reaching the coasts of Greece (Meusel *et al*., 1965).

Studies conducted by Nusrat et al., in 2019, at the Agricultural University of Bangladesh, on *G. grandiflorus*, showed that the planting distance of 25×30 cm and the mass over 40 g of the corms had a significant effect on plant height, the number of leaves, the number of days until the appearance of the floral stem, the length of the floral stem, the number of flowers on the stem as well as the weight of the stem.

In the 'Friendship' cultivar, the planting depth, combined with different sizes of corms, can significantly influence the characters of the plants. The corms with a mass of 15 g, planted at a depth of 5 cm, had the lowest number of days until the onset of vegetation, until the appearance of the floral stem, the tallest stems, the largest number of leaves and the most flowers on the stem (Uddin *et al.*, 2002).

The aim of this scientific research is to determine the influence of corms size used in the establishment of *G. byzantinus* crops, on the growth, development and decorative appearance of plants.

MATERIAL AND METHOD

The research was carried out in the period 2019-2020, in the experimental field of Floriculture discipline, within the University of Agricultural Sciences and

Veterinary Medicine of Iasi. The climate, specific to the northeastern region of Romania, has a pronounced continental character, being influenced by air masses of eastern origin. In summer, dry weather with high temperatures prevails, and in winter the effect of air masses coming from the north and northeast is fully felt. The crops were established on November 16, 2019, with tubers of *G. byzantinus* from its own collection. Corms were sorted, according to mass, into three categories that made up the three experimental variants: V_1 - >10 g; V_2 – 7-9 g and V_3 - < 7 g. The experiences were organized into randomized blocks, with three repetitions (20 plants /rehearsal) (fig. 1). The determinations and observations were made in 2020 after the plants started in the vegetation. For statistical interpretation of the results was used the method of variance analysis (Săulescu and Săulescu, 1967).

V_1 V_2 V_3

Fig. 1 Aspects from the experimental field

RESULTS AND DISCUSSIONS

The start of vegetation of the corms used in the establishment of crops was 100% in V_1, 92% in V_2 and 88% in V_3 (fig. 2). From the total number of plants in vegetation, they formed floral stems 92% in V_1, 73.9% in V_2 and 44.8% in V_3 (fig. 1).

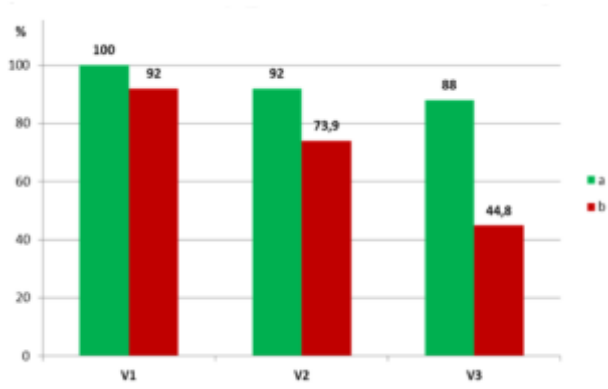

Fig. 2. Corms started in vegetation (a) and those that formed floral stems (b) (%)

Table 1.

The main morphological and ornamental characteristics of *Gladiolus byzantinus* plants

Var.	Number of shoots/plant				Number of stems/plant				The height of the stem				Number of flowers/plant			
	The absolute value (pieces)	% comp. to x	Diff. from $\bar{x}$	Sign.	The absolute value (pieces)	% comp. to x	Diff. from $\bar{x}$	Sign.	The absolute value (cm.)	% compared to x	Diff. from $\bar{x}$	Sign.	The absolute value (pieces)	% comp. x	Diff. from $\bar{x}$	Sign.
V1	3.8	140.75	+1.1	xxx	1.7	154.55	+0.6	x	51.3	97.9	-1.1	ns	11.1	140.51	+3.2	xxx
V2	2.9	107.41	+0.2	x	1.0	90.91	-0.1	ns	54.7	104.39	+2.3	x	7.1	89.87	-0.8	ns
V3	1.5	55.56	-1.2	000	0.5	45.45	-0.6	0	51.1	97.52	-1.3	ns	5.6	70.89	-2.3	00
$\bar{x}$	2.7	100,0	-	-	1.06	100,0	-	-	52.3	100,0	-	-	7.9	100.0	.	-

The symbols to indicate the significance of the differences from the control (average) are: ns = non significant; o/x = negative/ positive significant difference; oo/xx = negative/ positive distinct significant difference; ooo/xxx = negative/ positive very significant difference.

LSD5%=0,2	LSD5%=0,4	LSD5%=1,7	LSD5%=0,9
LSD1%=0,3	LSD1%=0,7	LSD1%=2,9	LSD1%=1,4
LSD0,1%=0,5	LSD0,1%=1,3	LSD0,1%=5,3	LSD0,1%=2,7

Table 1 presents the synthesis data on quantitative morphological characters determined during vegetation in the plants of the three experimental variants.

The number of shoots per plant ranged from 3.8 (V_1) to 1.5 (V_3). Compared to the average of the variant, of 2.7 shoots/plant, considered as a control, the differences registered in the all three variants were positive in variants V_1 and V_2 (respectively very significant in V_1 and significant in V_2) and negative (very significant) in V_3.

The number of flower stems/plant also varied depending on the size of the corm. Thus, in plants resulting from corms with a mass > 10 g, the number of stems exceeded the control by 54.55%, the differences being significantly positive. In the case of plants resulting from corms of the second size category (7-9 g), the number of stems was below the value of the control by about 10%, but from a statistical point of view, the differences were non significants. The plants resulting from the small corms formed the smallest number of stems, representing less than half of the control value and about one third of the number of stems formed by variant V_1. The differences from the control were significantly negative.

The height of the floral stems represented the character with smaller than average differences, these being between 51.3 cm at V_1, 54.7 cm at V_2 and 51.1 cm at V_3.

The results regarding the number of flowers per plant confirm that this character is considerably influenced by the quality of the material used to establish the crops, the differences between the three variants being conclusive. In V_1 the average number of flowers per plant was 11.1, with 40.5% above the average of the experience (control), and the variants V_2 and V_3, with 7.1 and 5.6 each flowers per plant, were below the control value with 10.3%, respectively 29.1%, the differences being statistically uninsured.

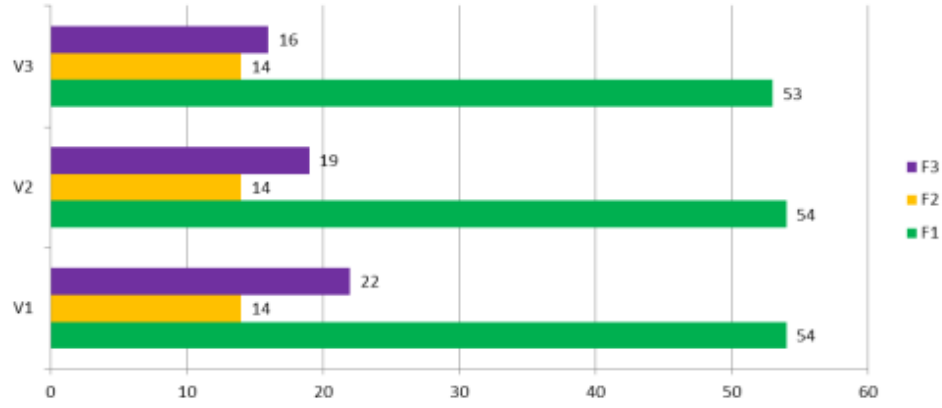

Fig. 3. Number of days from the start of vegetation until the appearance of the stems (F1), from the appearance of the stems until the beginning of flowering (F2) and from the opening of the flowers until the end of flowering (F3)

Based on the calendar datas that marked the main phenophases (the start in the vegetation, the appearance of the flower stems, the onset of flowering and the end of flowering), the time required for each of them was calculated. It was found that from the onset of vegetation to the appearance of flower stems, as well as from the appearance of stems to the beginning of flowering, the period was approximately similar. On the other hand, the duration of flowering, calculated from the opening of the first flowers to the complete passing of the flowers, ranged from 22 days at V_1, to 16 days at V_3 (fig. 3).

CONCLUSIONS

1. The size of the corms of *G. byzantinus* influenced most of the analyzed quantitative characters.

2. The high mass of corms (> 10 g) positively influenced the number of shoots/plant, the number of flower stems formed and the number of flowers/plant.

3. The differences regarding the flower stem height were non significant compared to the experience average. Smaller differences from the average of the experience were recorded at stems height.

4. The onset of vegetation, the appearance of flower stems and the opening of flowers were phenophases that started earlier in V_1 than in the other variants, the delays being 3 to 5 days.

5. The duration of flowering was 22 days at V_1, 19 days at V_2 and 16 days at V_3.

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