

# THE BEHAVIOR OF *ZANTEDESCHIA* AND *GLORIOSA* GROWN IN POTS

## COMPORTAREA PLANTELOR DE *ZANTEDESCHIA* ȘI *GLORIOSA* CULTIVATE LA GHIVECE

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**Abstract.** *Originating from tropical areas of Africa and Asia, Zantedeschia and Gloriosa genus include species which are grown in protected areas, when present in temperate climate conditions, as plants in pots, or as cut flowers. Gloriosa is growing lush and pretentious to environmental factors, especially to light intensity, which influences the quality and quantity of flowers. Zantedeschia, more common known as Cala, is very appreciated as cut flower. This paperwork presents aspects of the culture in pots of Zantedeschia hybrids ('Picasso', 'Cameo', 'Black Eyed Beauty' and 'Black Star') and Gloriosa superba species and its four cultivars ('Rotschildiana', 'Greenii', 'Lutea' and 'Orangerie'). Biological material was imported from Holland and observations were made on underground organs characteristics (diameter, mass), planting period up to the appearance of floriferous stems, production of flowers/plant.*

**Key words:** *Gloriosa, Zantedeschia, culture in pots*

**Rezumat.** *Originare din zonele tropicale ale Africii și Asiei, genurile Zantedeschia și Gloriosa cuprind specii care în condițiile de climat temperat continental se cultivă în spații protejate, ca plante la ghivece sau pentru valorificare ca flori tăiate. Gloriosa are o creștere luxuriantă și este pretențioasă față de factorii de mediu, îndeosebi față de intensitatea luminii, care influențează calitatea și cantitatea florilor. Zantedeschia, mai des întâlnită sub numele de cala, este foarte apreciată ca floare tăiată. Lucrarea prezintă aspecte privind cultura la ghivece atât a unor hibrizi de Zantedeschia ('Picasso', 'Cameo', 'Black Eyed Beauty' și 'Black Star'), cât și a speciei Gloriosa superba și patru cultivaruri ale acesteia ('Rotschildiana', 'Greenii', 'Lutea' și 'Orangerie'). Materialul biologic a fost importat din Olanda și au fost realizate observații privind caracteristicile organelor subterane (diametru, masă), perioada de la plantare până la apariția tijelor florifere, producția de flori/plantă.*

**Cuvinte cheie:** *Gloriosa, Zantedeschia, cultura la ghivece*

### INTRODUCTION

*Zantedeschia* and *Gloriosa* are two genres that include tropical plants with high ornamental value because of the beautiful flowers which are distinguished by elegance, vivid colors and interesting shape. They are perennials (underground organs such as tubers or rhizomes), in temperate climate conditions there are grown in protected areas, as plants in pots or in the ground of the greenhouses.

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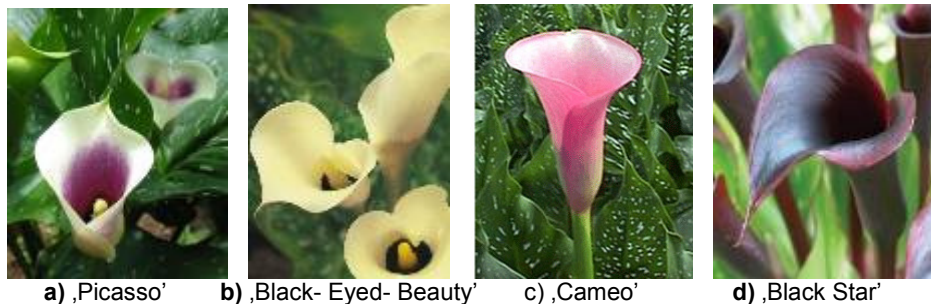
The genus *Zantedeschia*, commonly known as the arum or calla lily, is originates from the African continent. *Zantedeschia* species and their hybrids feature a range of cultivars with flower colour from dark red through pink, to orange, yellow and white. *Zantedeschia* is a commercial cut flower and potted plant (Funnell K.A., 1993 citat by Chen J., 2013). *Gloriosa superba* is known as a medicinal plant since ancient times in countries in Africa and tropical Asia. As an ornamental plant it is cultivated and valued as a cut flower, ranking among house plants due to unique elegance of flowers. Studies on species and cultivars of *Gloriosa* were made in terms of their taxonomic classification (Maroyi and van der Maesen, 2012), the anatomy of flowers (Vaik NP, Pai RM, 1986), methods of propagation (Khandel et al, 2011), etc.

In this paper it is presented a number of aspects about culture in pots of *Gloriosa* and *Zantedeschia* plants.

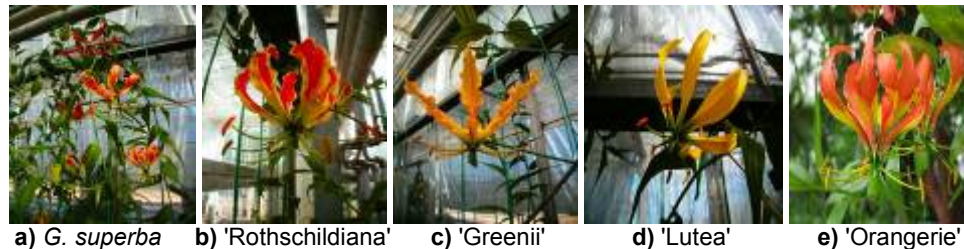
## MATERIAL AND METHOD

*Zantedeschia* and *Gloriosa* plants were grown in pots in the floricultural greenhouse of the University of Agricultural Sciences and Veterinary Medicine Iasi, Romania. In the experiment there were used four cultivars of *Zantedeschia*: 'Picasso' (fig. 1a), 'Black Eyed Beauty' (fig. 1b), 'Cameo' (fig. 1c) and 'Black Star' (fig. 1d).

There were also used *Gloriosa* tubers, from *G. superba* species (fig. 2a) and its four cultivars: *G. superba* 'Rotschildiana' (fig. 2b), *G. superba* 'Greenii' (fig. 2c), *G. superba* 'Lutea' (fig. 2d), *G. superba* 'Orangerie' (fig. 2e).



**Fig. 1 (a-d).** *Zantedeschia* hybrids used in the experiment



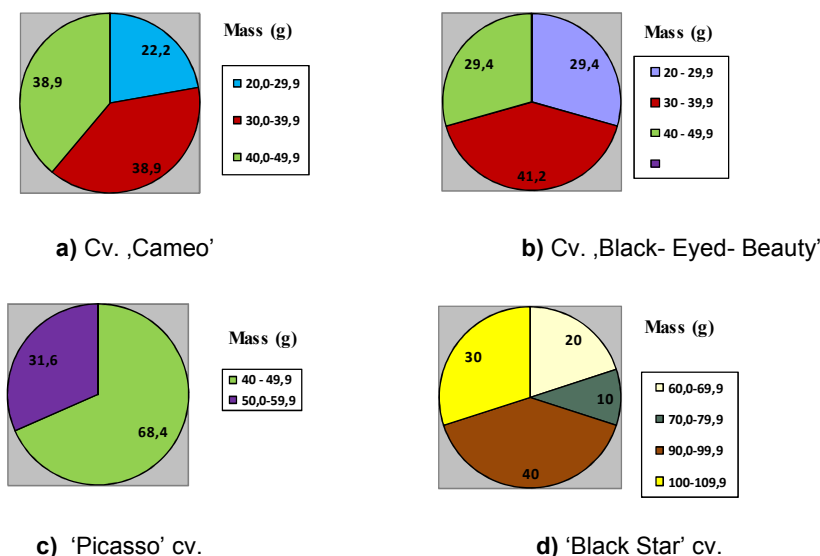
**Fig. 2 (a-e)** –*Gloriosa superba* cultivars used in the experiment (original)

Crop establishment was done in 2012, between 27th and 30th of March with tubers purchased from specialized companies in the Netherlands, and planting was done in 5L pots in a substrate made of red peat and garden soil (3:1). Determinations

that were made targeted tuber mass, length of time from planting until the entry into vegetation, number of flower buds and mature flowers.

## RESULTS AND DISCUSSIONS

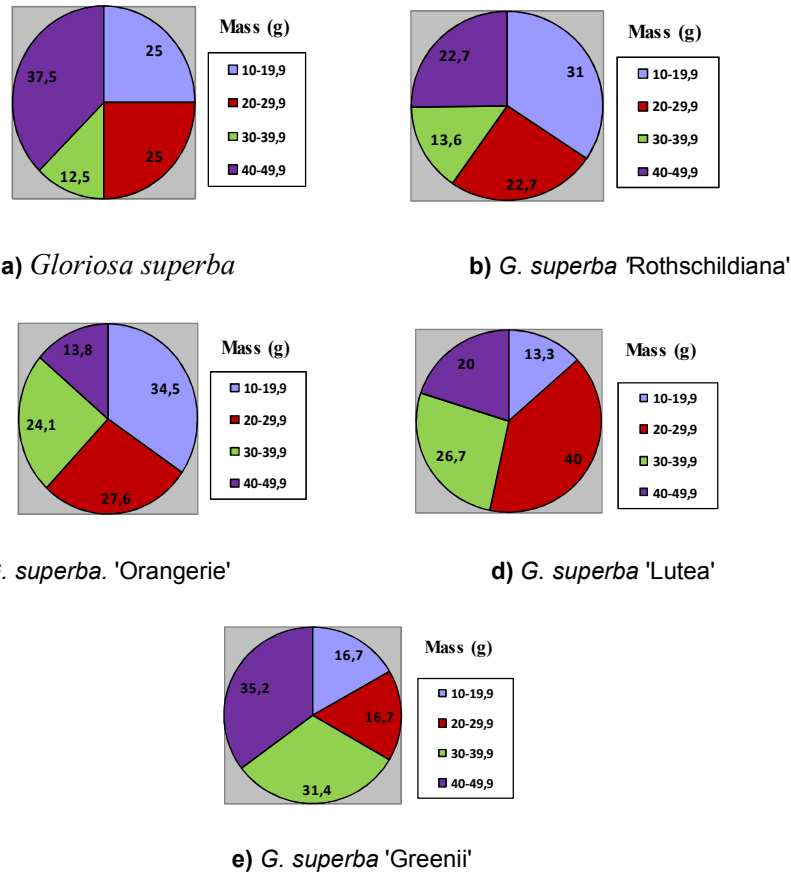
Tubers used for crop establishment were classified by size, based on mass recorded. On calla, the average weight of tubers varied depending on cultivar, from 36.5 g to 'Black-Eyed Beauty' and 91.4 g at 'Black Star'. Distribution of the categories of weight of tubers in these four cultivars is shown in fig. 3. At 'Cameo' cv. approx. 78% of the tubers had weight over 30 g, the rest being registered in the category of 20 to 29.9 g (fig. 3). 'Black-Eyed Beauty' cv., with the lowest average weight of tubers, recorded approx. 70% of the tubers weighing between 20 and 40 g and 29.4% of the tubers weighted from 40 to 49.9 g (figure 3b). Tubers of 'Picasso' cv. were assigned in a 2:1 ratio between the categories of 40 to 49.9 g, 50 to 59.9 g (fig. 3c). The 'Black Star' cv. have registered the largest tubers, their mass was between 60 and 110 g, 70% from the total of the tubers had more than 90 g and 30% of the tubers had between 60 and 70 g (fig. 3d). After weighing, the biggest tubers from each cultivar were used for planting: 40 to 49.9 g in 'Cameo' cv. and 'Black-Eyed Beauty' cv., from 50 to 59.9 g in 'Picasso' cv. and from 60 to 109.9 g in 'Black Star' cv.



**Fig. 3 (a-d) - Share of calla tuber weight classes**

At gloriosa, the tubers were smaller than those from calla, the mass was between 10 and 48 g. The share of calla tuber weight classes is represented graphically in fig. 4. At *Gloriosa superba*, 50% of the tubers had between 10 and 30 g, and 50% had between 30 and 50 g (fig. 4). The 'Rothschildiana' cv. had more than half (53.7 %) from the tubers under 30 g, 13.6 % were between 30 and 39.9 g, 22.7 % were between 40 and 49.9 g (fig. 4b). The 'Orangerie' cv. had small tubers,

only 13.8 % from the total number had more than 40 g, 34.5% were between 10 and 19.9 g, 27.6% were between 20 and 29.9 g, 24.1% were between 30 and 39.9 g (fig. 4c). The 'Lutea' cv. have 53.3% from tubers that weight between 10 and 30, the rest being distributed in proportion of 26.7% for group 30 - 39.9 g and 20% weight between 40 and 49.9 g (fig. 4d). More than half of 'Greenii' cv. tubers have over 30 g (66.6%) and 16.7% were assigned to categories 10 - 19.9 g and 20 - 29.9 g (fig. 4e). At *Gloriosa*, as well as at *Zantedeschia*, have been used to establish the crops the biggest tubers, except that, in this case, all varieties were from the same category (30-39.9 g and 40-49.9 g), but with different proportions between the two groups from one variety to another (higher proportion of superior category of *G. superba*, *G. s.* 'Greenii' and *G. s.* 'Rothschildiana').



**Fig. 4 (a-e)** - Share of *Gloriosa* tuber weight classes

The period from tubers planting to flowering is shown in figure 5. Among the *Zantedeschia* cultivars, the earliest was 'Picasso' cv. (66 days) and the belatedly was 'Cameo' (98 days). Cultivars of *Gloriosa* required a shorter period to flowering (between 61 and 72 days), the earliest being 'Greenii' and the belatedly 'Orangerie'.

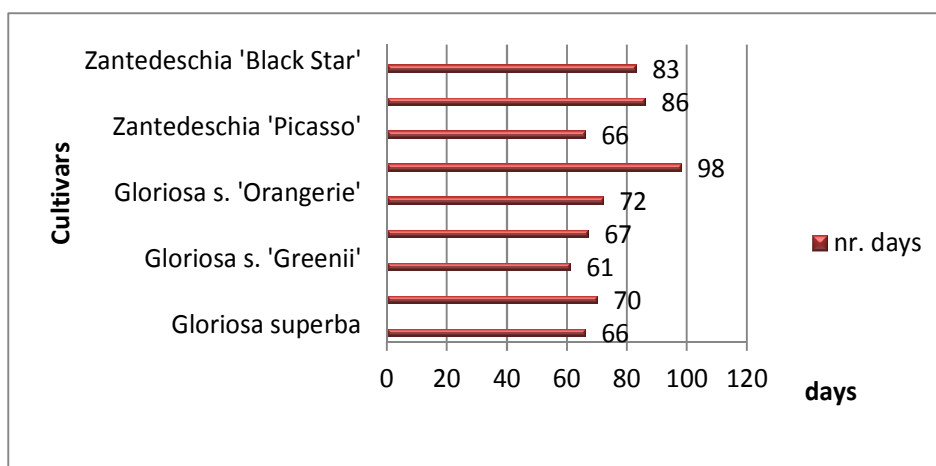


Fig. 5 -. The period of time from planting to flowering (no. of days)

Production of flowers per plant registered at *Zantedeschia* (table 1) shows the highest production in 'Black Star' cv., followed by 'Picasso' cv., the average differences of variants (cultivars) being positive (very significant or distinct significant). 'Black-Eyed Beauty' cv. and 'Cameo' cv., with productions of 1-1.1 flowers/plant are below average, with very significant negative differences.

Table 1

Production of flowers/plant at *Zantedeschia*

Cultivar	No. of flowers/ plant	% compared to the average	Diff.	Signif.
,Cameo'	1.1	47.83	-1.2	000
,Picasso'	3.0	130.43	+0.7	XX
,Black- Eyed- Beauty'	1.0	43.48	-1.3	000
,Black Star'	4.2	182.61	+1.9	XXX
<b>Average</b>	<b>2.3</b>	<b>100.0</b>	<b>control</b>	<b>control</b>

LSD 5% = 0.4; LSD 1% = 0.6; LSD 0,1% = 1.0

Table 2

Production of flowers/plant at *Gloriosa*

Cultivar	No. of flowers/plant	% compared to the average	Diff.	Signif.
<i>Gloriosa superba</i>	10.0	151.52	3.4	XXX
<i>Gloriosa s. 'Rothschildiana'</i>	6.2	93.94	-0.4	-
<i>Gloriosa s. 'Orangerie'</i>	3.2	48.48	-3.4	000
<i>Gloriosa s. 'Lutea'</i>	4.2	63.64	-2.4	000
<i>Gloriosa s. 'Greenii'</i>	9.2	139.39	2.6	XXX
<b>Average</b>	<b>6,6</b>	<b>100,00</b>	<b>control</b>	<b>control</b>

LSD 5% = 1.1; LSD 1% = 1.6; LSD 0,1% = 2.3

At *Gloriosa*, the number of flowers / plant varied between 3.2 and 10 (table 2). Above the average of variants were located *Gloriosa superba* (10 flowers/plant) and 'Greenii' cv. (9.2 flowers/plant), with significant differences; below average, with very significant negative differences were cultivars 'Orangerie' (3.2 flowers/plant) and 'Lutea' (4.2 flowers/plant). With a production of 6.6 flowers/plant, cv. 'Rothschildiana' showed significant differences compared to average.

From the data analysis in tables 1 and 2 there is a positive correlation between tuber size and flower production. Thus, at calla, cultivars 'Cameo' and 'Black-Eyed Beauty', which had smaller tubers (40- 49.9 g) had much lower yields compared to 'Black Star' cv. which had more than 60 g tubers. At gloriosa, differences are noted according to the proportion of tubers weighing over 40 g (the largest flowers production was at *G. superba* and *G. s. 'Greenii'* that predominant tubers were between 40 and 49.9 g).

## CONCLUSIONS

1. There is a positive correlation between the size of tubers used for crop establishment of *Zantedeschia* and *Gloriosa* and the flowering ability.
2. Flowering period of *Zantedeschia* and *Gloriosa* down menus after about 60 days after planting, the earliest being *Gloriosa* cultivars (61-72 days); callas requires 83-98 days from planting to flowering, except for 'Picasso' cv. (66 days).
3. Flowering capacity is differentiated among species and cultivars. *Gloriosa* form from 3.2 to 10 flowers / plant, whereas cultivars of *Zantedeschia* formed, on average, 2.3/plant (1 to 4.2 flowers/plant).

## REFERENCES

1. **Chen J., Funnell K. A., Lewis D. H., Eason J. R., Woolley D. J., 2013** - *Cytokinin and gibberellin delay regreening of spathe tissue of Zantedeschia 'Best Gold'*. Postharvest Biology and Technology 84, 61–65. Journal homepage: [www.elsevier.com/locate/postharvbio](http://www.elsevier.com/locate/postharvbio).
2. **Khandel A. K., Khan S., Ganguly S., Bajaj Amarjeet, 2011** - *In vitro shoot initiation from apical shoot buds and meristems of Gloriosa superba L. – an endangered medicinal herb of high commercial value*. Researcher; 3 (II) : 36-45. (ISSN: 1553-9865, [http:// www.sciencepub.net](http://www.sciencepub.net)).
3. **Maroyi A., 2012** - *The genus Gloriosa (Colchicaceae) - ethnobotany, phylogeny and taxonomy*. Thesis Wageningen University, Wageningen, NL, ISBN 978-94-6173-244-6, pag. 1-194
4. **Vaikos N. P., Pai R.M., 1986** - *The floral anatomy of Gloriosa superba L. and Tricyrtis pilosa Wall.* Plant Morphology Laboratory, Department of Botany, Marathwada University, Aurangabad, 431 004, India, pag. 233-239.
5. <http://cubits.org/pics/2011-07-09/eclayne/b5c9bf.jpg>;
6. <http://static.hollandbulbfarms.com/mmHBF50/Images/370X480/73152.jpg>;
7. [http://www.infoflora.com/imagenes\\_productos/3656.gif](http://www.infoflora.com/imagenes_productos/3656.gif);
8. <http://images.productserve.com/preview/1351/676467317.jpg>