ASPECTS REGARDING THE BEHAVIOR IN CULTURE OF DIFFERENT VARIETIES OF CALLA GROWN IN GREENHOUSE SOIL

ASPECTE PRIVIND COMPORTAREA ÎN CULTURĂ A DIFERITELOR SOIURI DE CALA CULTIVATE ÎN SOLUL SEREI

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Abstract. *More commonly known as Calla, Zantedeschia is one of the most popular cut flowers and it is included in the so-called group of aristocratic flowers. Calla is part of the least demanding plants, with a quite easy culture and to the reach of many farmers. This paperwork presents four hybrids of Zantedeschia (‚Picasso', ‚Cameo', ‚Black Eyed Beauty' and ‚Black Star') grown in greenhouse soil. Determinations and observations were performed regarding the vegetation of the plant and flower stem emergence, plant height, number of leaves / plant, number of flowers / plant, flower stem length. The results revealed the following: the early growth of 'Picasso' cultivar ('Cameo' the most belated); highest production of flowers/plant and flower stems shorter in 'Black Star' cultivar; the lower flower production 'Black Eyed Beauty' cultivar, but the longest flower stems; rich vegetation mass in 'Picasso' and 'Cameo' cultivars.*
Key words: *Zantedeschia cultivars, grown in greenhouse soil, morphological characteristics*

Rezumat. *Cunoscută mai frecvent sub numele de cala, Zantedeschia este una dintre cele mai apreciate flori tăiate, fiind inclusă în așa numita grupă a florilor aristocrate. Cala face parte din categoria plantelor puțin pretențioase, cu o cultură destul de ușoară și la îndemâna unui număr mare de cultivatori. În această lucrare sunt prezentați patru hibrizi de Zantedeschia (‚Picasso', ‚Cameo', ‚Black Eyed Beauty' și ‚Black Star'), cultivați în solul serei. S-au efectuat determinări și observații privind pornirea în vegetație a plantelor și apariția tijelor florale, înălțimea plantelor, numărul de frunze/plantă, numărul de flori/planta, lungimea tijelor florale. Rezultatele obținute au scos în evidență următoarele aspecte: timpurietatea cv. ‚Picasso' (‚Cameo' fiind cel mai tardiv); producția cea mai mare de flori/plantă şi tijele florale mai scurte la cv. ‚Black Star'; producția de flori cea mai mică la cv. ‚Black Eyed Beauty', dar tijele florale cele mai lungi; masa vegetativă bogată la cv. ‚Picasso', ‚Cameo'.*
Cuvinte cheie: *cultivaruri de Zantedeschia, cultură în solul serei, caractere morfologice.*

INTRODUCTION

Zantedeschia genus unites approx. 8 species of geophytes plants (with rhizomes and tubers), found on moist soils, in swamps or lakes shores of

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southern and eastern regions of South Africa (van Dijk and Kurpershoek, 2001). The genus name comes from the Italian botanist and physiologist, Giovanni Zanthedeschi (1773-1846). Known more commonly under the name of Calla or Calla Lily, *Zantedeschia* has no connection with true lilies (genus *Lilium*) or with their family. It is one of the most popular cut flowers and it is included in the so-called group of aristocratic flowers (Toma, 2009).

Callas draw attention by their original inflorescences consisting of spadix (inflorescence itself) and spathe (bracts) that protects bloom. *Zantedeschia* species and their hybrids have different colored spathes (white, from red or purple to pink or lilac, from deep yellow to pale yellow or orange etc.). No one knows exactly when and how Calla was introduced in Europe, but it appeared illustrated in royal gardens in Paris in 1664 and in the second half of the nineteenth century, exotic South African plant was introduced in the United States of America and began to appear as a subject in American art.

The species that are commonly found in culture: *Zantedeschia aethiopica* Spreng. (syn. *Calla aethiopica* L., *Richardia africana* Kth.) *Zantedeschia albimaculata* Baill., *Zantedeschia elliotiana* Engl. (syn. *Calla elliotiana* Knight., *Richardia elliotiana* W. Watson) and *Zantedeschia rehmanii* Engl. (syn. *Richardia rehmanii* N.E. Br.) (Cantor and Pop, 2008; Toma, 2009).

Zantedeschia aethiopica Spreng. is the most widespread species. Its underground organs are vigorous rhizomes, its leaves are large, shiny dark green colored and inflorescences are accompanied by white spathes. *Zantedeschia albimaculata* Baill. has a tuber in the ground, spear-shaped-sagittal leaves numerous white macules, white flowers, slightly greenish at the base and smaller than *Zantedeschia aethiopica. Zantedeschia elliotiana* Engl. has tubers, the oval-heart-shaped leaves have white macules yellow spathes. Many hybrids of *Zantedeschia* are based on *Z. elliotiana. Zantedeschia rehmanii* has also tubers, spear-shaped dark green leaves, smaller than the previous species. Spathe, pink, purple, white or yellow protects the spadix (Cantor and Pop, 2008; Şelaru, 2002).

MATERIAL AND METHOD

The research was conducted in the discipline of Floriculture at the University of Agricultural Sciences and Veterinary Medicine Iasi, Romania. The *Zantedeschia* cultivars that were used in the experiments:

- ‘Picasso' (fig. 1 a) is obtained from *Zantedeschia albimaculata* Baill. (leaves with white macules and gradient spathe from white to dark purple);
- ‘Black-Eyed Beauty' (fig. 1 b) is obtained from *Zantedeschia elliotiana* Engl. (leaves with many white macules, spathe with various shades of yellow-green and a black base "collar");
- ‘Cameo' (fig. 1 c) is obtained from *Zantedeschia albomaculata* Hook./Baill. (Janowska Beata, Roman A., 2010), with special color of the spathe, a combination of yellow and red, sometimes gradient and other times the colors merge;
- ‘Black Star' (fig. 1 d) is obtained from *Zantedeschia rehmanii* (leaves have white macules and spathe gives the impression that is black, actually it is dark red-purplish).

a) 'Picasso' **b)** 'Black- Eyed- Beauty' **c)** 'Cameo' **d)** 'Black Star'

Fig. 1 (a-d) - Hybrids of *Zantedeschia* used in the experiment (original)

The experiments were set up in the greenhouse soil by planting tubers at distances of 25/25 cm. Before planting, tubers were treated with a solution of 0.3% Topsin, by bathing them for 30 minutes. Establishment and maintenance works applied to the experimental cultures respected the technology recommended in the literature for this culture system. During the experiment, measurements were made regarding the vegetation of the plant and flower stem emergence, plant height, number of leaves/plant, number of flowers/plant, flower stem length.

RESULTS AND DISCUSSIONS

Table 1 presents the main technological and phenological data recorded at the experimental crops of Calla. The vegetation began after 40 days of crop establishment, and for the four varieties this was done during 11 days. The first who started vegetation was 'Picasso ', and the last one, 'Cameo'.

Table 1

Technological and phenological data

Cultivar	Crop establishment	Starting vegetation period	Appearance of steams	End of vegetation period
'Cameo'	21st of April	10th of June	17th of July	3rd of October
'Picasso'	21st of April	30th of May	11th of June	13th of September
'Black- Eyed- Beauty'	21st of April	3rd of June	29th of June	18th of September
'Black Star'	21st of April	5th of June	30th of June	20th of September

Large differences between varieties are noted between the length of time required from the start of the vegetation and the appearance of flower stems (tables 1 and 2). The 'Cameo' cultivar, which required 37 days (12 days more compared to average) was found to be the belatedly, registering very significant

positive differences. However, ‘Picasso' cultivar was the earliest, requiring only 12 days until floral stem appearance, the differences from the average being very significant negative. Cultivars ‘Black-Eyed Beauty' and ‘Black Star' showed values close or equal to the average and the differences were insignificant.

Table 2

The period from starting vegetation period until appearance of the steams

Cultivar	No. of days until appearance of steams	% compared to the average	Differences	Signification
‘Cameo’	37	148.0	+12	**xxx**
‘Picasso’	12	48.0	-13	**000**
‘Black- Eyed-Beauty’	26	104.0	+1	**-**
‘Black Star’	25	100.0	0	**-**
Average	**25**	**100.0**	**control**	**control**

LSD 5% = 2.4
LSD 1% = 3.6
LSD 0, 1% = 5.8

As for the number of flowers per plant (table 3), it is noted that the variety ‘Black Star’ is the most productive, the average number of flowers/plant is 4.7. In descending order, follows ‘Picasso' with 3.7 flowers/plant, ‘Cameo' with 1.5 flowers/plant and ‘Black-Eyed Beauty' with 1.3 flowers/plant. From the statistical interpretation of the results on flower production, in relation to the average, we obtained positive differences in cultivars ‘Black Star' (very significant deviation) and 'Picasso' (distinct significant deviation). The cultivars ‘Cameo' and 'Black-Eyed Beauty', the differences were very significant negative.

Table 3

Production of flowers/plant

Cultivar	No. of flowers/plant	% compared to the average	Differences	Signification
‘Cameo’	1.5	53.57	-1,3	**000**
‘Picasso’	3.7	132.14	+0.9	**XX**
‘Black- Eyed-Beauty’	1.3	46.43	-1.5	**000**
‘Black Star’	4.7	167.86	+1.9	**XXX**
Average	**2.8**	**100.0**	**control**	**control**

LSD 5% = 0.4
LSD 1% = 0.7
LSD 0, 1% = 1.1

Measurements were also made on the increase dynamics of plant height, starting from 75 days after planting (5th of July) and up to 110 days after

planting, when the maximum height was reached. At the last measurements (8th of August) it was observed that the ‘Black-Eyed Beauty' cultivar is the highest, the plants reached an average height of 66.5 cm. The other three cultivars were characterized by a smaller size, but with similar values ranging between 54.42 cm and 55.55 cm (figure 2).

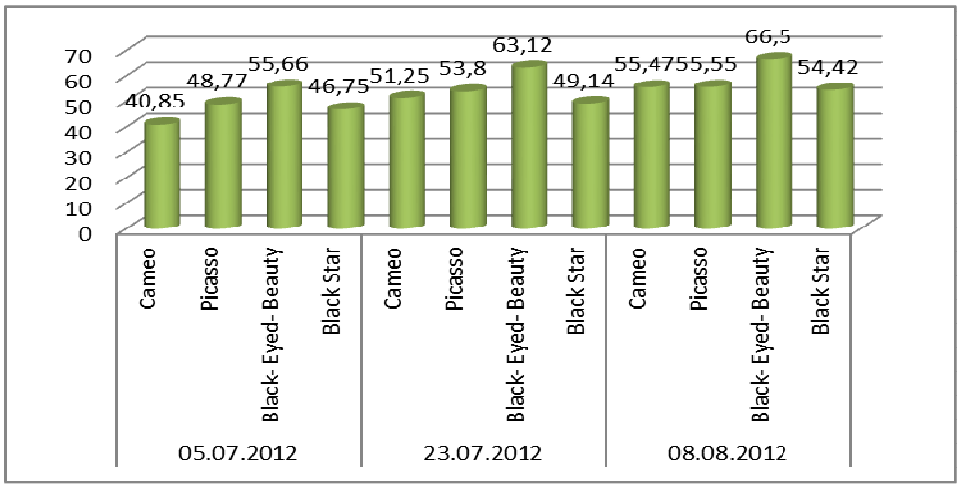

Fig. 2 - Dynamics of growth in plants height

Regarding the number of leaves per plant (figure 3), it highlights cultivars ‘Cameo' and 'Picasso', with 13 and 11 leaves per plant. Cultivars, ‘Black-Eyed Beauty' and 'Black Star' have a reduced vegetative mass, registering an average of 4-6 leaves per plant.

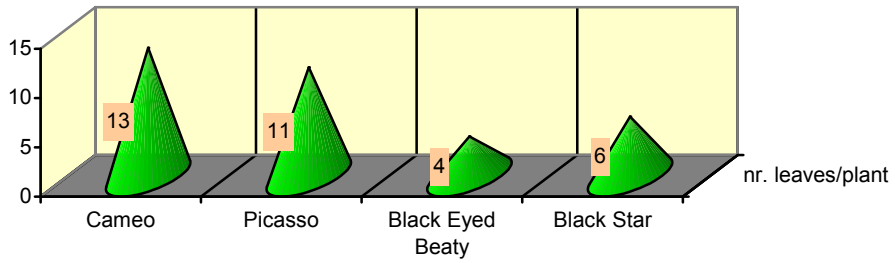

Fig. 3 - Number of leaves/plant

Flower stems length (figure 4) varies between 44.9 and 56.5 cm, the longest flower stems are at ‘Black-Eyed Beauty' cultivar, and the shortest are at ‘Black Star' cultivar.

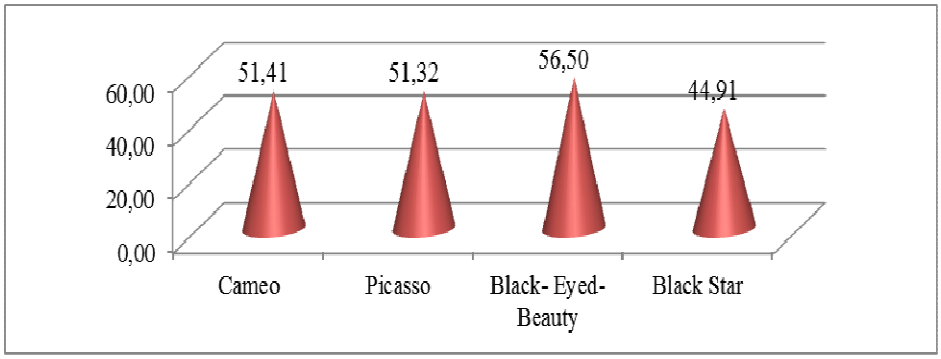

Fig. 4 - Flower stems length (cm)

CONCLUSIONS

1. The starting of the vegetation for the four cultivars of Calla was triggered after approx. 40 days after planting tubers, the first who started vegetation was ‘Picasso’ cultivar and the last one was ‘Cameo' cultivar.

2. The emergence of floriferous stem and beginning of flowering between cultivars kept the same order: the earliest cultivar was ‘Picasso', with 12 days until the appearance of the floriferous stems and the belatedly was ‘Cameo', which required 37 days until the appearance of flower stems. Towards average, cultivars ‘Black-Eyed Beauty' and 'Black Star' showed insignificant differences.

3. ‘Black Star' cultivar was the most productive (4.7 flowers/plant) followed by ‘Picasso’ (3.7 flowers/plant), ‘Cameo' (1.5 flowers/plant) and ‘Black-Eyed Beauty' (1.3 flowers/plant).

4. Floral stem length varies between 44.9 and 56.5 cm, the longest flower stems being at ‘Black-Eyed Beauty' cultivar and the shortest at Black Star' cultivar.

5. ‘Cameo' and 'Picasso’ cultivars form a rich vegetation mass (13 and 11 leaves/plant) compared with cultivars ‘Black-Eyed Beauty’ and 'Black Star' which were recorded with 4-6 leaves/plant.

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