ASPECTS REGARDING PRESERVATION AND USE OF CROCOSMIA CUT FLOWERS

ASPECTE PRIVIND PĂSTRAREA ŞI VALORIFICAREA FLORILOR TĂIATE DE CROCOSMIA

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Abstract. *Lately, crocosmia is gaining more and more interest on the cut flowers market in Romania. The ornamental value of the cut flowers is given by their longevity and the number of flowers on the stem, as well as by the general appearance of inflorescences. In this research, determinations were made on the influence of storage solutions on the longevity of Crocosmia cut flowers, using six experimental variants: V_1-distilled water (control); V_2-commercial floral preservative-Vital Fleur (5 g/L); V_3-gibberellic acid (150 mg/L); V_4-boric acid (150 mg/L); V_5-silver nitrate (1000 ppm); V_6-potassium benzoate (0.03%). Observations and determinations showed, that boric acid (V_4) had the best results in terms of the number of open flowers per stem. AgNO3 (V_5), Vital Fleur (V2) and GA3 (V_3) positively influenced the number of open flowers on the stem. Instead, potassium benzoate (V_6) had negative influenced both the number of flowers open on the stem and their longevity.*
Key words: cut flowers, crocosmia, vase life, preservative solutions

Rezumat. *În ultima perioadă, crocosmia a capătat un interes din ce în ce mai mare pe piaţa florilor tăiate din România. Valoarea ornamentală a florilor tăiate este dată de longevitatea acestora şi numărul florilor de pe tijă, precum şi de aspectul general al inflorescenţelor. În această lucrare s-au făcut determinări asupra influenţei soluţiilor de păstrare asupra duratei de viaţă a florilor tăiate de crocosmia, folosind şase variante experimentale: V_1-apă distilată (martor); V_2-conservant comercial/ Vital Fleur (5g/L); V_3–acid giberelic (150 mg/L); V_4-acid boric (150 mg/L); V_5–azotat de argint (1000 ppm); V_6-benzoat de potasiu (0,03%). Observaţiile şi determinările efectuate au evidenţiat faptul că $AgNO_3$ (V_5) a dat cele mai bune rezultate în ceea ce priveşte numărul de flori deschise pe tijă. Acidul boric (V_4) şi Vital Fleur (V_2) au influenţat pozitiv numărul florilor deschise pe tija florală, iar GA_3 (V_3) a favorizat pozitiv numărul de flori deschise pe tijă numai în primele zile de păstrare. În schimb, benzoatul de potasiu (V_6) a influenţat negativ atât numărul de flori deschise pe tija florală, cât şi durata de viaţă a acestora.*
Cuvinte cheie: flori tăiate, crocosmia, durata de păstrare, soluţii de păstrare

INTRODUCTION

The genus *Crocosmia* belongs to the family Iridaceae and contains eleven species of tuberobulbous perennials, most of which originate in South Africa and the tropics. Of these species, only four are of major importance in the production

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of hybrids: *C. aurea*, *C. masoniorum*, *C. paniculata* and *C. pottsii*.

In Greek, ″crocos″ means saffron, and "osme" translates to smell, an allusion to the scent of flowers from several species of the genus.

***Crocosmia* 'Lucifer'** is a hybrid (*C. masoniorum* x *C. paniculata*) obtained by Alan Bloom from Bressingham, Norfolk, Great Britain, around 1966.

It presents as subterranean organs globular corms, with a diameter of 2-3 cm. The plant has a grassy appearance, the leaves are linear-lanceolate or ensiform, flat, with a prominent median rib; the basal ones are often wider than the cauline ones. The inflorescence is a slightly flexed panicle, with a zig-zag axis, with 10-20 flowers. The membranous bracts, brown or reddish in color, with brown spots, are longer on the outside and shorter on the inside. The flowers are 3-4 cm long, zygomorphic, orange or reddish. The fruit is a capsule with a diameter of 0.7-1.0 cm. The seeds are dark brown, usually aborted (Rico *et al*., 2013). Flowering in crocosmia begins in July and ends in October. The combination of leaves, flowers and fruits of this species gives a higher value to the gardens. The fruit is also very ornamental, and the plants are often left in the garden until late autumn. The color of the fruit varies depending on the stage of ripening, at first in shades of green, and later (September-October) they become brown and rusty. (Armitage and Laushman, 1993).

It multiplies by seeds or by corms. It is a plant that loves water and moist soils, but without excess water. The corms are planted in early April, at a depth of about 10 cm. In autumn, the corms are removed, the dead parts are removed and stored in a place away from moisture and with good air circulation, at a temperature of 4-9ºC.

The paper aims to analyze the influence of different storage solutions on the duration of maintaining the quality of crocosmia cut flowers. Various products mentioned in the literature have been used, both for crocosmia and for other species. Microbial contamination is the main cause of the limited the vase life of cut flowers (Kazemi *et al*., 2011). The solutions used to keep the cut flowers have the role either to fortify the flowers, after they have suffered from lack of water, or to stimulate flowering or to keep them longer for the consumer (Amăriuţei, 1987). Thus, the use of Floralife 200 and Floralife 300 solutions increases the vase life of crocosmia cut flowers by 7.9 and 8.2 days, respectively, compared to the control, while also improving the quality of the inflorescences (Żurawik *et al*. 2019). In carnations, keeping the flower stalks in silver nitrate (1200 ppm) for 5-20 minutes increases the life of cut flowers by more than 50% (Kofranek and Paul, 1972 quoted by Anjum *et al*., 2001), and in those of tuberoses, in a concentration of 50 and 200 ppm, it led to a maximum vase life of the floral stems (8 days). Good results in terms of duration of tuberose cut flowers were also obtained in standard preservative solutions (Anjum *et al*., 2001). Boric acid in 0.02% concentration prolongs the vase life of carnation cut flowers, positively influencing the diameter of the flowers and their ornamental value (Bo-ying, 2008). Positive results in terms of prolonging the vase life of gerbera cut flowers

were obtained using as a storage solution of gibberellic acid in a concentration of 2.5, 5 or 7.5 mg/L^{-1} (Emongor, 2004).

MATERIAL AND METHOD

The experiments were performed in 2021, at *Crocosmia* 'Lucifer'. The plants from which the flower stalks were harvested were cultivated in the didactic field of the Floriculture discipline within USV Iaşi. The flower stalks were harvested from healthy and vigorous plants. Prior to harvesting, all utensils used to harvest the stems were cleaned. The inflorescences were harvested in the colored bud phase during the morning to avoid dehydration. They were cut obliquely, after which they were introduced into the storage solutions. Both the water and the storage solutions were changed daily and the basal cut was refreshed. The cut flowers were kept in a room with a temperature of approx. 20-22°C.

The crocosmia cut flowers were grouped in six experimental variants, depending on the storage solution (fig. 1): V_1 - distilled water, V_2 – commercial floral preservative Vital Fleur (5 g/L), V_3 – the gibberellic acid (150 mg/L) , V_4 – the boric acid (150 mg/L), V_5 – the nitrate of silver (1000 ppm) and V_6 – the bezoate of potassium (0.03%). The study was conducted by following completely randomized design, with three replications.

Observations and determinations on the number of open flowers were made daily, until the moment when the flowers lost their turgidity.

V_1 V_2 V_3 V_4 V_5 V_6

Fig. 1. Aspects regarding the experience with crocosmia cut flowers.

RESULTS AND DISCUSSIONS

The results regarding the total number of open flowers on the crocosmia floral stems subjected to storage are presented graphically in figure 2.

The boric acid (V_4) gave the best results, totaling 32 open flowers on the stem throughout the storage period. The nitrate of silver (V_5) also had a positive effect on the number of open flowers on the stem, recording 31 open flowers on the stem at the end of the storage period. The gibberellic acid (V_3) and Vital Fleur (V_2) also positively influenced the number of open flowers on the floral stem, having at the end of the storage period a number of 27.6 and 26.03 open flowers on the stem, respectively. In contrast, the benzoate of potassium (V_6) negatively affected both the number of open flowers on the flower stalk and their vase life.

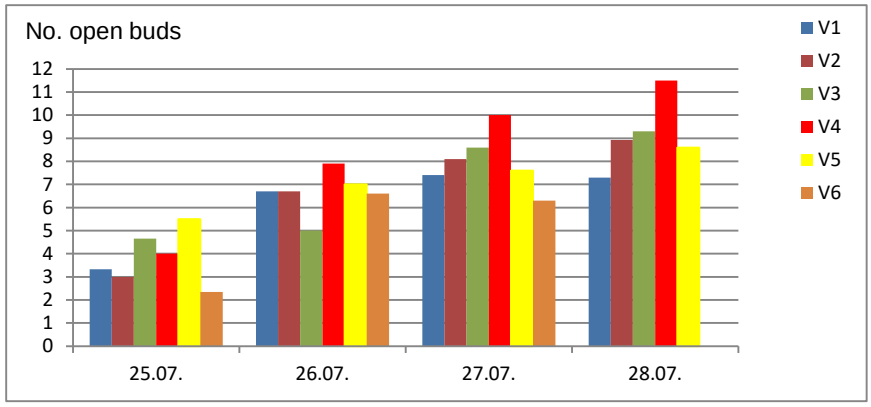

Fig. 2. Total number of open flowers / stem

Regarding the number of open flowers on each branch of the floral stem subject to storage (fig. 3) it was highlighted that the silver nitrate (V_5) gave the best results in terms of the number of open flowers on the main stem (23.8); on the other hand, on the branches, the number of open flowers was lower, respectively 3.3 open buds on the first branch, 1.3 on the second branch and 0.3 on the third branch. Regarding the opening of flowers on each branch of the flower stalk, variant V_4, (boric acid) had a smaller number of open flowers on the main branch (19.2), but recorded the highest number of open flowers on the first branch (9.2) and the third branch (2). It was found that Vital Fleur (V_2) positively influenced the number of open flowers on the main stem (18 open flower buds) and on branches I and II, but did not register any open flower buds on the third order branches.

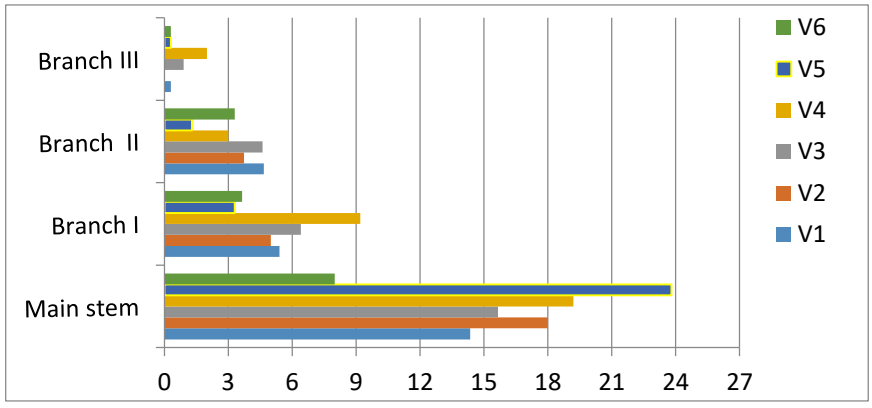

Fig. 3. Number of open flower buds / branching

The gibberellic acid (V_3) had a smaller number of open flowers on the main stem (15.66) compared to Vital Fleur (18 open flowers), but had 6.4 open flower buds on branch I, 4.6 flower buds on branch II and 0.9 flower buds on the third branch, on average, with 3.17 fewer open flowers on the main stem branches. At the opposite

pole, with the fewest flowers open on the stem (16.54) is the V_6 variant (benzoate of potassium). The benzoate of potassium negatively affected both the number of open flowers on the flower stalk and their vase life, with foliage wilting faster, respectively on the third day after the establishment of the experiments (one day earlier compared to the other experimental variants). The fading of crocosmia flowers consisted in changing their color from red-orange to brick and detaching them from the stem.

The best results in terms of life of cut flowers were obtained in V_2 (Vital Fleur) with a maximum number of 9 days (fig. 4). Good results were also obtained for the V_4 variant with a vase life of 7 days. With the shortest life is the V_5 variant with a number of 3 days.

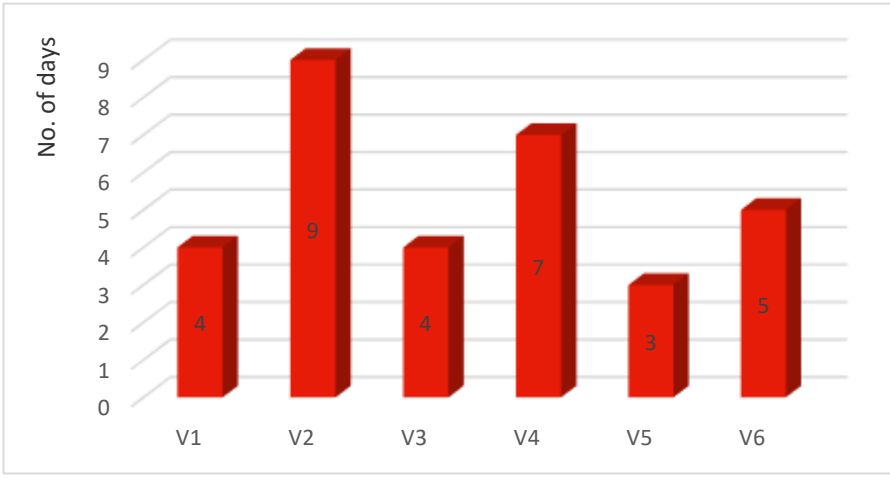

Fig. 4. The flower storage time

As cut flowers, crocosms are of special importance due to the colors, the special appearance and the good life of the vessel, and can be used successfully in the most diverse types of compositions.

Fig. 5. Bouquets and arrangements with crocosmia cut flowers

It is recommended to use the crocosmia inflorescences in bouquets and arrangements with flower species that have a similar vase life to crocosmias, so that

the bouquet has a fresh appearance for as long as possible. The crocosms can be used both in rustic arrangements, along with species such as *Zinnia elegans*, *Canna indica*, *Celosia argentea* and ornamental herbs, and in elegant arrangements, in combination with *Hydrangea macrophylla*, *Eustoma grandiflorum*, roses, etc.

CONCLUSIONS

1. The crocosms are highly valued due to the beauty and elegance of the dress, the various colors, the resistance of the flowers in the water and on the plant.

2. As cut flowers, crocosms are highly prized for their longevity, from 4 to 10 days, depending on storage conditions.

3. The best results in terms of the total number of flowers open on the flower stalk in *Crocosmia* 'Lucifer' were obtained by storage in boric acid (150 mg/L).

4. The nitrate of silver (1000 ppm) and gibberellic acid (150 mg/L) also had a positive effect on the number of open flowers.

5. The best results in terms of the number of open flower buds on the main branch were obtained using silver nitrate (1000 ppm) as the storage solution.

6. The commercial floral preservative (Vital Fleur) determined the longest vase life of the crocosmia cut flowers.

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