

**Estimation of decorative value of chosen cultivars  
of *Dahlia × cultorum* Thorsr. et Reis. treated  
with flurprimidol**

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ABSTRACT

14 cultivars and 7 clons of *Dahlia × cultorum* Thorsr. et Reis. were grown in 20 cm pots. Flurprimidol as Topflor 015 SL (1.5% flurprimidol) was applied as a single foliar spray at concentration 112.5 mg dm<sup>-3</sup>. Growth regulator was applied 4 weeks after pinching. Most of the flurprimidol treated plants were significantly smaller than untreated ones. The retardant reduced canopy diameter and peduncle length of majority examined cultivars. Flurprimidol had no significant effect on the inflorescence diameter.

## INTRODUCTION

Dahlia – a popular plant for borders or flower-beds, was brought to Europe at the end of the 18<sup>th</sup> century. During many years of cultivation thousands of cultivars have been bred of various colours, shape and height of the plants. There is a great interest in cultivation of dahlias in pots lately as they can be used to decorate a terrace, patio or balcony. The plants which are to be used in this way should be rather low, compact and have uniform flowering. They demand a special technology of cultivation and formation as well as using growth regulators. Flurprimidol is one of the substances commonly used for stunting of many decorative plants. This specific retardant among others is used in the cultivation of geranium *Pelargonium hortorum* L. H. Bailey (Zawadzińska et al. 2002), chrysanthemum *Dendranthema grandiflora* Tzvelev (Pobudkiewicz and Nowak 1997), *Streptocarpus hybridus* hort. (Pobudkiewicz 2000 a), and *Globba winitii* Siam (Pobudkiewicz and Podwyszyńska 1999).

The aim of the present experiment was to estimate the influence of flurprimidol upon the size and shape of plants and the size of inflorescences of chosen cultivars of *Dahlia cultorum*.

## MATERIAL AND METHODS

The object of the experiment carried out during the years 2001 – 2002 were 14 dahlia cultivars (*Dahlia cultorum* Thorsr. et Reis.): ‘Krynica’, ‘Gea’, ‘Red Pigmy’, ‘Syria’, ‘Parc Princes’, ‘Helio’, ‘Zefir’, ‘Angora’, ‘Fen Celeste’, ‘Gilda’, ‘Lolita’, ‘Nati’, ‘Orange’, ‘Pepi’ and 7 clones cultivated by W. Legutko Company in Smolice and signed with the following symbols: 2231/1, 2372/4, 2396/9, 2392/23, 2401/13, 2374/7, 2543/1. The stem cuttings taken with “a heel” were rooted in a greenhouse at the beginning of April. After taking roots plants were planted in pots of 20 cm diameter. The substrate of 6.8 pH was a mixture of high peat and pinebark (1 : 1) enriched with the Osmocote Fertilizer 3-4 1 kg m<sup>-3</sup> of the substrate. In the middle of May plants in the pots were taken off frame of the greenhouse to the plots. When the plants were 10-12 cm high (i.e. about 4 weeks after planting them in the pots) they were nipped of above the third pair of leaves and then, after another 4 weeks, they were sprinkled with flurprimidol at the concentration of 112.5 mg dm<sup>-3</sup>.

The experiment consisted of 4 replications, 84 plants in each of them. During the whole period of flowering the inflorescence peduncle and the diameter of the capitulum were regularly measured. At the beginning of October, before the end of the experiment, the diameter and height of the plants were measured. Obtained results were analysed statistically using method of variance analysis and Tukey’s trust intervals at the relevance level at  $p = 0.05$ .

## RESULTS AND DISCUSSION

The average height of the plants treated with flurprimidol oscillated between 34 and 61 cm. Retardant used at the concentration of 112.5 mg dm<sup>-3</sup> inhibited growth of the examined cultivars by 3 to 21% compared to controls. The strongest effect of stunting was observed in such cultivars as 'Krynica', 'Pepi', 'Gea' and the clone 2374/7 – as they gave plants lower than the control by 9 - 9.5 cm. On the other hand, the lowest height reduction – of only 2 cm was observed in 'Red Pigmy' and 'Parc Princes' (Table 1). Pudelska and Hetman (2002) obtained similar results. The authors demonstrated that a single sprinkle with flurprimidol in a concentration of 0.105 ml dm<sup>-3</sup> inhibited the growth of dahlia plants by 10 to 25%. Some attempts were also made for stunting dahlias with other substances. Singh et al. (1994) used Alar (daminozide) in an experiment with *Dahlia variabilis*. They used a concentration of 150 mg dm<sup>-3</sup> that restricted the growth of the examined cultivars.

Table 1. Effect of flurprimidol application on the morphological traits of *Dahlia* depending on the cultivar (means for 2001 – 2002)

| Cultivar/clone                         | Plant height<br>[cm] |              | Reduction<br>of<br>plant<br>height<br>[%] | Plant diameter<br>[cm] |              |
|--|----------------------|--------------|---|------------------------|--------------|
|  | control              | flurprimidol |   | control                | flurprimidol |
| 'Krynica'                              | 55.8 f-i             | 46.3 m-r     | 17.0                                      | 41.9 f-k               | 36.5 l-m     |
| 'Gea'                                  | 43.3 rs              | 34.2 u       | 21.0                                      | 31.9 n                 | 27.1 o       |
| 'Red Pigmy'                            | 48.7 l-o             | 47.1 m-p     | 3.3                                       | 48.3 a-d               | 42.7 e-i     |
| 'Syria'                                | 55.7 f-i             | 51.1 klh     | 8.3                                       | 49.1 abc               | 45.4 c-f     |
| 'Parc Princes'                         | 57.9 d-g             | 56.0 f-i     | 3.3                                       | 41.5 f-k               | 39.1 j-l     |
| 'Helio'                                | 49.3 lhm             | 45.6 opr     | 7.5                                       | 40.2 h-l               | 38.1 k-l     |
| 'Zefir'                                | 59.4 cde             | 51.0 klh     | 14.1                                      | 39.4 i-l               | 37.8 k-m     |
| 'Angora'                               | 53.5 ijk             | 47.9 l-p     | 10.5                                      | 39.4 i-l               | 35.7 l-n     |
| 'Fen Celeste'                          | 63.0 ab              | 58.7 def     | 6.8                                       | 40.4 g-l               | 39.8 i-l     |
| 'Gilda'                                | 64.1 a               | 60.5 bcd     | 5.6                                       | 51.1 ab                | 49.2 abc     |
| 'Lolita'                               | 57.0 e-h             | 53.5 ijk     | 6.1                                       | 46.8 b-e               | 43.9 d-i     |
| 'Nati'                                 | 62.4 abc             | 55.3 ghi     | 11.4                                      | 51.8 a                 | 43.4 e-i     |
| 'Orange'                               | 51.9 jkl             | 46.8 m-p     | 5.8                                       | 48.2 a-d               | 44.6 c-h     |
| 'Pepi'                                 | 46.3 m-r             | 36.8 tu      | 20.5                                      | 40.1 h-l               | 40.5 g-l     |
| 2231/1                                 | 63.0 ab              | 55.5 f-i     | 11.9                                      | 45.1 c-f               | 41.3 f-k     |
| 2372/4                                 | 61.1 a-d             | 55.4 ghi     | 9.3                                       | 48.6 abc               | 43.4 e-i     |
| 2396/9                                 | 55.1 g-j             | 47.5 m-p     | 13.8                                      | 45.7 c-f               | 40.4 g-l     |
| 2392/23                                | 44.9 prs             | 37.9 t       | 15.6                                      | 36.4 l-n               | 33.2 l-n     |
| 2401/13                                | 45.9 n-r             | 42.1 s       | 8.3                                       | 43.1 e-j               | 36.2 l-n     |
| 2374/7                                 | 64.1 a               | 55.1 g-j     | 14.0                                      | 43.3 e-j               | 40.4 g-l     |
| 2543/1                                 | 54.4 hij             | 49.0 l-n     | 9.3                                       | 44.9 c-g               | 39.2 j-l     |
| Mean                                   | 55.1                 | 42.1         |   | 43.7                   | 39.9         |
| LSD <sub>0.05</sub> for: cultivar - O  | 2.22                 |              |   | 3.27                   |              |
| LSD <sub>0.05</sub> for: retardant - R | 0.38                 |              |   | 0.56                   |              |
| LSD <sub>0.05</sub> for: O x R         | 3.14                 |              |   | 4.62                   |              |

Means followed by the same letters are not significantly different at p = 0.05

Flurprimidol caused reduction of diameter of the examined plants. Such cultivars as 'Nati', 'Red Pigmy', 'Krynica', 'Gea' and clones 2401/13, 2543/1, 2396/9, 2372/4, were more compact and they were narrower than the controls by 5 to 8.5 cm. Similar reaction was observed in experiments with *Pelargonium hortorum* (Pobudkiewicz and Nowak 1999) where flurprimidol used in a concentration of 15 mg dm<sup>-3</sup> caused relevant diameter reduction of plants of 'Ina' and 'Bargpalais'.

The use of flurprimidol caused changes of inflorescence capitula size. One could observe a reduction of inflorescence peduncles, dependent on cultivar by 2 to 19%, which helped to improve the decorative value of the plants. In cultivars 'Parc Princes', 'Pepi', 'Orange', 'Helio', 'Angora', 'Red Pigmy', 'Lolita' and clones 2401/13, 2374/7 and 2543/1 the length of the peduncle oscillated between 9.5 and 15 cm. Those plants treated with retardant had inflorescence peduncles shorter than the controls from 1.6 to 2.3 cm (Table 2).

Table 2. Effect of flurprimidol application on the morphological traits of *Dahlia* inflorescences depending on the cultivar (means for 2001 – 2002)

| Cultivar/clone                         | Peduncle length [cm] |              | Inflorescence diameter [cm] |              |
|--|----------------------|--------------|-----------------------------|--------------|
|  | control              | flurprimidol | control                     | flurprimidol |
| 'Krynica'                              | 10.9 m-p             | 11.0 m-p     | 7.6 mno                     | 7.6 mno      |
| 'Gea'                                  | 13.0 h-l             | 12.1 j-m     | 8.2 j-n                     | 8.2 j-n      |
| 'Red Pigmy'                            | 13.1 h-l             | 11.2 mno     | 10.7 h                      | 10.5 h       |
| 'Syria'                                | 13.9 e-i             | 13.6 f-j     | 11.0 gh                     | 10.8 h       |
| 'Parc Princes'                         | 17.1 a               | 14.8 c-g     | 11.9 ef                     | 12.0 def     |
| 'Helio'                                | 16.2 abc             | 14.1 e-i     | 9.3 i                       | 8.9 ij       |
| 'Zefir'                                | 15.3 b-e             | 14.9 c-g     | 13.6 a                      | 13.5 a       |
| 'Angora'                               | 13.8 f-i             | 11.8 k-m     | 11.7 efg                    | 11.6 fg      |
| 'Fen Celeste'                          | 14.9 c-g             | 13.8 f-i     | 12.4 cde                    | 12.3 def     |
| 'Gilda'                                | 16.3 abc             | 15.7 a-d     | 7.5 no                      | 7.3 o        |
| 'Lolita'                               | 13.4 g-j             | 11.6 ltm     | 8.1 k-n                     | 8.1 k-n      |
| 'Nati'                                 | 15.4 b-e             | 14.0 e-h     | 7.5 n-o                     | 8.0 l-o      |
| 'Orange'                               | 11.7 k-m             | 9.5 pr       | 4.1 p                       | 4.0 p        |
| 'Pepi'                                 | 13.1 h-l             | 10.8 m-p     | 8.5 i-t                     | 8.2 j-n      |
| 2231/1                                 | 16.5 ab              | 15.1 b-f     | 13.4 a                      | 12.7 bcd     |
| 2372/4                                 | 12.8 i-t             | 11.3 t-n     | 8.8 ijk                     | 8.9 ij       |
| 2396/9                                 | 9.9 n-r              | 8.7 r        | 8.2 j-n                     | 8.3 j-m      |
| 2392/23                                | 9.7 opr              | 8.5 r        | 7.3 o                       | 7.3 o        |
| 2401/13                                | 15.3 b-e             | 13.5 g-j     | 8.6 i-l                     | 8.7 ijk      |
| 2374/7                                 | 14.9 c-g             | 13.2 h-k     | 13.0 abc                    | 13.2 ab      |
| 2543/1                                 | 14.5 d-h             | 12.9 i-l     | 7.8 t-o                     | 8.3 j-m      |
| Mean                                   | 14.5                 | 12.5         | 9.4                         | 9.4          |
| LSD <sub>0.05</sub> for: cultivar - O  |                      | 1.11         |                             | 0.52         |
| LSD <sub>0.05</sub> for: retardant - R |                      | 0.19         |                             | 0.89         |
| LSD <sub>0.05</sub> for: O x R         |                      | 1.57         |                             | 0.73         |

Means followed by the same letters are not significantly different at p = 0.05

With the exception of 2231/1 clone, flurprimidol did not cause relevant changes of the inflorescence size.

Many authors confirmed that flurprimidol had a positive influence upon the growth and shape of numerous species of decorative plants, among others *Ranunculus asiaticus* (Piskornik et al. 1996), *Dianthus caryophyllus* L. (Pobudkiewicz and Nowak 1994), *Viola wittrockiana* Gams (Startek and Wolańska 1998), and *Cuphea ignea* A.DC. (Pobudkiewicz 2000 b). However, defining the general prescriptions of the use of this preparation is difficult. Fixing the definite concentration which will give satisfactory result depends not only on species but also upon the individual features of particular cultivars (Pobudkiewicz et al. 2000). This regularity was also confirmed by the present experiments, where the examined cultivars and clone had various reactions to the applied retardant. For example in 'Red Pigmy', and 'Parc Princes' cultivars flurprimidol caused a relevant shortening of inflorescence peduncles, however it did not cause any relevant growth retardation.

The obtained results show that both the examined cultivars and clone can be used for pot cultivation. Flurprimidol used at the concentration of  $112.5 \text{ mg dm}^{-3}$  did not cause any phytotoxic injuries of plants. Among the dahlia cultivars treated with a retardant there were the most decorative ones: 'Krynica', 'Gea', 'Nati', 'Orange', 'Pepi', and clone 2396/9, 2392/23, 2543/1. Height of the plants was proportional to their diameter, and that is why they looked very well in containers – they had a form of low lumps, of a compact, almost round shape with the inflorescences slightly towering over the plant.

## CONCLUSIONS

1. Spraying dahlias with flurprimidol once, at the concentration of  $112.5 \text{ mg dm}^{-3}$  caused relevant growth reduction except for 'Red Pigmy' and 'Parc Princes' and the reduction of plant diameter in most of examined cultivars. The cultivars and clones which reacted with the greatest change of their shape were: 'Krynica', 'Gea', 'Nati' and the clones: 2372/4, 2396/9, 2401/13, and 2543/1.
2. Flurprimidol improved the decorative value in most of the examined cultivars. The plants sprayed with retardant were lower, more compact and had shorter inflorescence peduncles. The size of the inflorescence did not change with the exception of 2231/1 clone.

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OCENA WALORÓW DEKORACYJNYCH WYBRANYCH ODMIAN DALII  
OGRODOWEJ (*DAHLIA CULTORUM* THORSR. ET REIS.)  
TRAKTOWANYCH FLURPRIMIDOLEM

Streszczenie: Badania dotyczyły 14 odmian i 7 klonów hodowlanych dalii ogrodowej (*Dahlia cultorum* Thorsr. et Reis). Rośliny uprawiano w doniczkach o średnicy 20 cm. Flurprimidol w postaci preparatu Topflor 015 SL (zawierającego 1,5% flurprimidolu) był stosowany jednokrotnie dolistnie w stężeniu 112,5 mg dm<sup>-3</sup>. Regulator wzrostu stosowano 4 tygodnie po uszczykiwaniu roślin. Flurprimidol powodował istotne ograniczenie wzrostu oraz zmniejszenie średnicy roślin i skrócenie długości szypuły kwiatostanowej u większości badanych odmian. Flurprimidol nie wpływał w sposób istotny na wielkość kwiatostanów dalii.

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