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# USEFULNESS OF SOME HYACINTHS CULTIVARS FOR FORCING IN WATER

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**Abstract**. An assessment was made of the usefulness for forcing of five cultivars of *Hyacinthus orientalis* L.: 'Carnegie', 'City of Haarlem', 'Delft Blue', 'Jan Bos', and 'Lady Derby'. The bulbs were planted on 14 October 2003 and 2004 in Flexy-tray type of pallets filled with water and in plastic boxes with a standard medium. The bulbs were cooled for 12 or 14 weeks. It was found that forcing lasted shorter in the water-filled trays, while longer inflorescence stems were obtained in plants forced in the standard medium. The cooling of the bulbs for 14 weeks resulted in the shortening of the forcing time and in the lengthening of inflorescence stems.

**Key words**: hyacinths, forcing in water

## INTRODUCTION

Forcing in water has become an increasingly popular technology today. Its advantages include the elimination of the traditional medium, easy control of the root system, good health status of plants, a 30–40% reduction in labour, and easier flower harvest [Dirks 2000a, Lee and Suh 2002]. Since 1993, when the forcing of tulips in water was introduced in The Netherlands on a large scale, this technology has kept improving. New types of cultivation pallets have been tried [Kos 2001], and growth regulators and mineral components have been tested in the forcing of tulips [Nelson and Niedziela 1998a, b, Lee and Suh 2002, Yamasaki et al. 2002]. Also, tests have been conducted of the usefulness for forcing in water of major cultivars of tulips [Krause and Zygmunt 2000] and irises [Krzymińska and de Mezer 2007].

Hyacinths in Poland are largely forced in pots. Traded on flower exchanges are also cut hyacinths, but they come from import. It is possible to obtain cut hyacinths through the forcing of plants in the standard medium after cooling them longer than those forced in pots [de Hertogh 1996]. In the literature one can also find information about forcing hyacinths in water [Dirks 2000b]. Thus, a study was made to determine the usefulness of hyacinths cultivars for forcing in water and the length of the period of bulb cooling.

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## MATERIAL AND METHODS

In the experiment, five cultivars of *Hyacinthus orientalis* L. were used: 'Carnegie' (white flowers), 'City of Haarlem' (creamy flowers), 'Delft Blue' (blue flowers), 'Jan Bos' (dark pink flowers), and 'Lady Derby' (light pink flowers). The bulbs, 15–16 cm in circumference, were planted on 14 October 2003 and 2004 in Flexy-tray containers. They consisted of trays supporting foamed-polystyrene extrusion-moulded plates with funnel-shaped openings in which the bulbs were placed. The control was bulbs planted in plastic boxes filled with a medium consisting of garden soil and de-acidified high-moor peat (2:1/v:v). The experiment combination involved two repetitions with 15 bulbs each. The bulbs were cooled for 12 or 14 weeks at a temperature of 9°C. Then the containers were transferred to a greenhouse where the temperature was 18–20°C. When necessary, the water in the pallets was replenished and the plants in boxes were watered. When the first flowers in an inflorescence had reached the opening stage, the length of the forcing period was taken down. The length of the inflorescence stem was measured, and after it had been cut, also its weight. The results were processed using the analysis of variance, and the means were grouped using Duncan's test at the $\alpha = 0.05$ significance level.

## RESULTS AND DISCUSSION

The forcing of the hyacinths depended on both, the forcing medium and the duration of the bulb cooling period. In most of the cultivars, the plants that reached the commercial stage 1–5 days sooner were those forced in water rather than those grown in the standard medium (tab. 1). It was only in 'Delft Blue' that the medium was found to have had no effect on the length of the forcing period. Krause and Zygmunt [2000] observed no differences in the length of the forcing period in almost all the studied tulip cultivars forced in water and in the standard medium. Dirks [2000b] reports that the cultivation of irises in water takes half the time needed for the standard medium method. Hence the length of the period of forcing in water probably depends on the species and cultivar.

When forcing hyacinths for cut flowers in January, De Hertogh [1996] recommends the cooling of 'Carnegie' bulbs for 14 weeks, and 'Delft Blue' and 'Jan Bos' ones for 13 weeks. In the experiment reported, forcing hyacinths in the greenhouse lasted shorter after the cooling of the bulbs for 14 weeks. It was only in the cultivar 'City of Haarlem' that no difference was found in the duration of forcing the plants after the cooling of their bulbs for 12 and 14 weeks. In this cultivar the forcing took some 20 days or longer. In the other cultivars, the forcing period usually lasted under 20 days.

The kind of medium also affected the length of the inflorescence stem in the cultivars 'Carnegie', 'Delft Blue', 'Jan Bos', and 'Lady Derby' (tab. 2). The plants forced in the standard medium had longer inflorescence stems. In those cultivars, except 'Delft Blue', forcing in the standard medium also lasted longer. In the cultivar 'City of Haarlem', in turn, while forcing took about 5 days more in the standard medium, no effect of the kind of medium on the length of the inflorescence stem was observed. In various

Table 1. Length of forcing period of some hyacinth cultivars depend on length of bulbs cooling period and using medium (days)

Tabela 1. Długość okresu pędzenia kilku odmian hiacyntów w zależności od długości okresu chłodzenia cebul oraz użytego podłoża (dni)

| Cultivar<br>Odmiana | Length of cooling period (weeks)<br>Długość okresu chłodzenia (tygodnie) | Medium – Podłoże | | Mean<br>Średnia |
|---|---|---|---|---|
| | | water<br>woda | standard<br>standardowe | |
| | 12 | 19.5 c | 20.2 c | 19.9 b |
| 'Carnegie' | 14 | 15.9 a | 17.4 b | 16.7 a |
| | mean – średnia | 17.7 a | 18.8 b | |
| | 12 | 19.2 a | 25.9 b | 22.5 a |
| 'City of Haarlem' | 14 | 19.9 a | 23.1 ab | 21.5 a |
| | mean – średnia | 19.6 a | 24.5 b | |
| | 12 | 17.7 b | 17.9 b | 17.8 b |
| 'Delft Blue' | 14 | 15.0 a | 15.0 a | 15.0 a |
| | mean – średnia | 16.3 a | 16.4 a | |
| | 12 | 18.6 bc | 19.9 c | 19.3 b |
| 'Jan Bos' | 14 | 16.7 a | 18.1 ab | 17.4 a |
| | mean – średnia | 17.7 a | 19.0 b | |
| | 12 | 16.4 b | 17.4 c | 16.9 b |
| 'Lady Derby' | 14 | 14.2 a | 15.6 b | 14.9 a |
| | mean – średnia | 15.3 a | 16.5 b | |

Means followed by the same letter do not differ significantly at $\alpha = 0.05$ (Duncan's test)
Średnie oznaczone tą samą literą nie różnią się istotnie na poziomie $\alpha = 0,05$ (test Duncana)

Table 2. Length of inflorescence stem of some hyacinth cultivars depend on length of bulbs cooling period and using medium (cm)

Tabela 2. Długość pędu kwiatostanowego kilku odmian hiacyntów w zależności od długości okresu chłodzenia cebul oraz użytego podłoża (cm)

| Cultivar<br>Odmiana | Length of cooling period (weeks)<br>Długość okresu chłodzenia (tygodnie) | Medium – Podłoże | | Mean<br>Średnia |
|---|---|---|---|---|
| | | water<br>woda | standard<br>standardowe | |
| | 12 | 19.4 a | 21.9 b | 20.6 a |
| 'Carnegie' | 14 | 21.7 b | 22.8 b | 22.3 b |
| | mean – średnia | 20.6 a | 22.3 b | |
| | 12 | 19.9 a | 20.5 a | 20.2 a |
| 'City of Haarlem' | 14 | 22.8 ab | 24.9 b | 23.9 b |
| | mean – średnia | 21.4 a | 22.7 a | |
| | 12 | 19.4 a | 23.1 b | 21.2 a |
| 'Delft Blue' | 14 | 20.1 a | 23.3 b | 21.6 a |
| | mean – średnia | 19.7 a | 23.2 b | |
| | 12 | 17.1 a | 19.5 b | 18.3 a |
| 'Jan Bos' | 14 | 18.2 ab | 22.8 c | 20.5 b |
| | mean – średnia | 17.6 a | 21.1 b | |
| | 12 | 12.4 a | 13.1 b | 12.7 a |
| 'Lady Derby' | 14 | 14.7 c | 16.8 d | 15.7 b |
| | mean – średnia | 13.5 a | 14.9 b | |

Means followed by the same letter do not differ significantly at $\alpha = 0.05$ (Duncan's test)
Średnie oznaczone tą samą literą nie różnią się istotnie na poziomie $\alpha = 0,05$ (test Duncana)

plant species, the longer cooling of their bulbs results in longer flower stems being obtained [Keun 1997, Krzymińska 1998]. In the experiment reported, this relation was found to be absent only in the cultivar 'Delft Blue'.

Table 3. Weight of inflorescence stem of some hyacinth cultivars depend on length of bulbs cooling period and using medium (g)
Tabela 3. Masa pędu kwiatostanowego kilku odmian hiacyntów w zależności od długości okresu chłodzenia cebul oraz użytego podłoża (g)

| Cultivar<br>Odmiana | Length of cooling period (weeks)<br>Długość okresu chłodzenia (tygodnie) | Medium – Podłoże | | Mean<br>Średnia |
|---|---|---|---|---|
| | | water<br>woda | standard<br>standardowe | |
| 'Carnegie' | 12 | 17.1 a | 18.6 ab | 17.8 a |
| | 14 | 19.3 ab | 22.1 b | 20.7 a |
| | mean – średnia | 18.2 a | 20.3 a | |
| 'City of Haarlem' | 12 | 22.4 a | 22.1 a | 22.2 a |
| | 14 | 23.1 a | 24.4 a | 23.7 a |
| | mean – średnia | 22.7 a | 23.2 a | |
| 'Delft Blue' | 12 | 19.1 a | 21.6 a | 20.3 a |
| | 14 | 20.3 a | 21.4 a | 20.9 a |
| | mean – średnia | 19.7 a | 21.5 a | |
| 'Jan Bos' | 12 | 14.2 a | 16.8 b | 15.5 a |
| | 14 | 17.6 bc | 18.8 c | 18.2 b |
| | mean – średnia | 15.9 a | 17.8 b | |
| 'Lady Derby' | 12 | 13.4 a | 13.5 a | 13.4 a |
| | 14 | 14.8ab | 15.4 b | 15.1 b |
| | mean – średnia | 14.1 a | 14.4 a | |

Means followed by the same letter do not differ significantly at $\alpha = 0.05$ (Duncan's test)
Średnie oznaczone tą samą literą nie różnią się istotnie na poziomie $\alpha = 0{,}05$ (test Duncana)

Having analysed the interaction among the factors of the experiment, it can be stated that relatively short inflorescence stems were developed by plants of the cultivar 'Lady Derby' forced in water after the cooling of the bulbs for 12 and 14 weeks, and those forced in the standard medium after cooling for 12 weeks. The obtained parameters ranging from 12.4 to 14.7 cm may disqualify this cultivar from the selection of hyacinths to be grown for cut flowers. However, in a large-scale production the cutting is performed in a special way, by pulling or cutting a stem together with a heel. As a result, the stems are longer and their longevity prolonged [de Hertogh 1996].

The weight of the inflorescence stem did not depend on the kind of medium employed (tab. 3). Only in the cultivar 'Jan Bos' forced in the standard medium were the stems heavier. In this cultivar and in 'Lady Derby' it was also found that the length of the cooling of the bulbs affected the parameter studied. Inflorescence stems of greater weight grew after the bulbs had been cooled for 14 weeks.

On the basis of the obtained results, it can be stated that the cultivars used in the experiment can be forced in water after their bulbs had been cooled for 14 weeks.

## CONCLUSIONS

1. Forcing the hyacinth cultivars 'Carnegie', 'City of Haarlem', 'Jan Bos', and 'Lady Derby' lasted shorter in Flexy-tray pallets filled with water than in boxes with the standard medium.

2. Longer inflorescence stems of the hyacinth cultivars 'Carnegie', 'Delft Blue', 'Jan Bos', and 'Lady Derby' were obtained with forcing in the standard medium. The kind of medium had no effect on the weight of the inflorescence stem. Only in the cultivar 'Jan Bos' forced in the standard medium were inflorescence stems heavier.

3. The cooling of the bulbs for 14 weeks shortened the forcing period in the cultivars 'Carnegie', 'Delft Blue', 'Jan Bos', and 'Lady Derby', and helped lengthen inflorescence stems in the cultivars 'Carnegie', 'City of Haarlem', 'Jan Bos', and 'Lady Derby'. In the cultivars Jan Bos and Lady Derby, the inflorescence stems also had greater weight.

Practical conclusion: Recommended for forcing hyacinths in water are the cultivars 'Carnegie', 'City of Haarlem', 'Delft Blue', 'Jan Bos', and 'Lady Derby' after the cooling of the bulbs for 14 weeks.

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## PRZYDATNOŚĆ KILKU ODMIAN HIACYNTA DO PĘDZENIA W WODZIE

**Streszczenie**. Oceniono przydatność do pędzenia pięciu odmian hiacynta wschodniego *Hyacinthus orientalis* L.*:* 'Carnegie', 'City of Haarlem', 'Delft Blue', 'Jan Bos' and 'Lady Derby'. Cebule sadzono 14 października 2003 i 2004 r. do palet Flexy-tray wypełnionych wodą i plastikowych skrzynek z podłożem standardowym. Cebule chłodzono przez 12 lub 14 tygodni. Stwierdzono, że pędzenie trwało krócej w paletach wypełnionych wodą, dłuższe pędy kwiatostanowe uzyskano u roślin pędzonych w podłożu standardowym. Chłodzenie cebul przez 14 tygodni wpłynęło na skrócenie pędzenia i wydłużenie pędów kwiatostanowych.

**Słowa kluczowe**: *Hyacinthus*, pędzenie w wodzie

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