

RESEARCH ON THE BEHAVIOUR OF SOME HYACINTH VARIETIES IN DIFFERENT TYPES OF FORCING FOR BLOOMING IN OUT OF SEASON

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Abstract

Forcing bulbs is frequently used to obtain hyacinths blooming in out of season. Both variety and forcing conditions are of major importance in obtaining a quality flowering. In this context, our research aimed followed behaviour of new varieties in four different forcing hyacinths. The hyacinth varieties were: 'Peter Stuyvesant', 'Delft Blue', 'Blue Jacket', 'Sky Jacket', 'City of Haarleem', 'Fondant', 'Splendid Cornelia', 'Anne Marie' and 'Carnegie'. Variants were forcing the variation factors when applying the cold period (before or after planting) and place planting bulbs (in pots, directly in the greenhouse soil, vases with water). The results show that, for all varieties, the best option to forcing was the period of cold that was applied before planting bulbs and cold treated bulbs were planted directly in soil greenhouse. Forcing results in a vase with water to follow closely the values obtained for directly forcing greenhouse soil in pots while forcing led to the worst results. The quality of floral stems and flowers was superior varieties, 'Blue Jacket', 'Sky Jacket' and 'Delft Blue' while 'Splendid Cornelia', 'Anne Marie' and 'Carnegie' varieties were marked by the lowest values of the elements flowering. These results shows that the hyacinth, in cultures forced, cold therapy has maximum effect when applied before planting bulbs planting bulbs and previously treated with cold soil is directly in the greenhouse.

Keywords: blooming, bulb, forcing, hyacinth, variety

INTRODUCTION

Forcing flower bulb species is a widely used method for getting cut in season flowers [2, 3]. Duration and time of application of cold treatment on the bulbs have a major importance in the success of a culture forced hyacinths [1, 4]. The same type of treatment applied cold bulb variety is what significantly differentiates the quantity and quality of flowering hyacinth bulbs forced in culture [1, 4]. Given the widely acknowledged importance of the two factors in the process of obtaining hyacinths blooming in season - the variety and characteristics of the cold period applied bulbs - our experiences have turned to testing the nine varieties of hyacinths in four different variants of compulsion.

MATERIAL AND METHOD

The biological material used to achieve these experiences was the nine of the most cultivated varieties of Hyacinth 'Peter Stuyvesant', 'Delft Blue', 'Blue Jacket', 'Sky Jacket', 'City of Harlee', 'flux', 'Splendid Cornelia', 'Anne Marie' and 'Carnegie'. For

each of the nine varieties of cold treatment duration was 6 weeks. What was different when applying this treatment with cold (3 °C) and place the cold treated bulbs were planted. Thus, the combination of experimental factors results indicate four types of forcing, as illustrated below:

- A. Planting the bulbs in pots → 6 weeks cold → forcing chamber (8-9 °) - Photo 1;
- B. Cold 6 weeks → planting the bulbs in pots → greenhouse (21 °) - photo 2;
- C. Cold 6 weeks → bulbs planted directly in soil in the greenhouse (21 °) - Photo 3;
- D. Cold 6 weeks → put bulbs in vases with water (kept in the room to force the 8-9 °) - photo 4.

Quality elements used to forcing bulbs in this experience are presented in Table 1.

Observations were made on the evidence of vegetative and flowering growth: height of the cone of leaves, leaf length, leaf number, number of flower stems, stem length, number of flowers in bloom.



Photo 1. The pots of bulbs from variant A of forcing



Photo 2. The pots of bulbs from variant B of forcing



Photo 3. The pots of bulbs from variant C of forcing



Photo 4. The pots of bulbs from variant D of forcing

For items vegetative growth observations were made monthly and for those of flowering observations were performed every 2 weeks. For statistical interpretation of the results were analyzed correlations between various elements of the biological cycle in relation to the alternative to force and variety.

Table 1. The elements of quality of bulbs used in forcing

Variety	Weight (g)	Diameter (cm)	Height (cm)	Circumference (cm)
<i>SPLENDID CORNELIA</i>	60,25	5,5	4,5	16,50
<i>BLUE JACKET</i>	100,5	6,5	4,5	19,25
<i>SKY JACKET</i>	84,25	5,5	5,5	16,25
<i>ANNE MARIE</i>	60,75	5,3	5,5	15,50
<i>FONDANT</i>	90,75	5,5	5,2	17,50
<i>DELFT BLUE</i>	80,5	5,0	5,5	16,50
<i>CARNEGIE</i>	88,5	5,5	5,3	17,75
<i>CITY OF HAARLEEM</i>	72,25	5,5	5,5	16,75
<i>PETER STUYEVESANT</i>	83,6	7,1	6,3	19,50

RESULTS AND DISCUSSIONS

The results show that, for all varieties, the best option to forcing was the period of cold that was applied before planting bulbs and cold treated bulbs were planted directly in soil greenhouse.

A. Forcing in pots placed in the chamber to force (8-9 °C).

From Table 2 it is found that the number of pounds does not vary greatly from one variety to another, ranging between 6.2 limits the varieties 'flux' and 'Peter Stuyevesant' and 7.6 the variety 'Sky Jacket'.

Table 2. The final values of vegetative growing and flowering of plants from variant A of forcing

Variety	Leaves number	Lenght of leaves (cm)	Lenght of steam flower (cm)	No. of flowers in inflorescence
<i>SPLENDID CORNELIA</i>	6,3	23,4	26,8	22,8
<i>BLUE JACKET</i>	6,5	19,6	26,2	35,4
<i>SKY JACKET</i>	7,6	28,4	30,4	29,2
<i>ANNE MARIE</i>	7,4	35,5	26,2	23,4
<i>FONDANT</i>	6,2	23,8	31,8	33,4
<i>DELFT BLUE</i>	7,4	18,2	33,4	31,2
<i>CARNEGIE</i>	6,5	25,4	29,6	34,6
<i>CITY OF HAARLEEM</i>	7,4	18,2	27,4	25,2
<i>PETER STUYEVESANT</i>	6,2	16,4	23,2	29,4

Leaves vary in length but wider range, from 16.4 cm to the variety 'Peter Stuyevesant' at 35.5 cm from the variety 'Anne Marie'.

Regarding the elements flowering - flower stem length and number of flowers in bloom, the hierarchy of varieties is generally different than vegetative growth elements. Thus, the rod

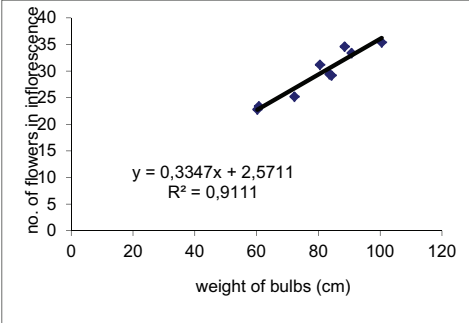
length floral exhibits the lowest value - 23.2 cm - the variety '*Peter Stuyvesant*', the maximum - 33.4 cm - were recorded in cultivar '*Delft Blue*'. Number of flowers in bloom is the minimum variety '*Splendid Cornelia*' (22.8) and maximum variety '*Blue Jacket*' (35.4) - Photo 5.



Photo 5. The flowered plant from '*Blue Jacket*' variety in variant A of forcing

Distribution of these values of vegetative growth and flowering did not show a significant correlation between the two elements of the biological cycle of the plant. Instead, there was a linear correlation, direct and weight of bulbs used in between planting and the number of flowers in bloom (Fig. 1), confirming the importance of quality planting bulbs use.

Fig. 1. The correlation between the weight of bulbs and number of flowers in inflorescence from variant A of forcing



B. Forcing in pots placed in the greenhouse (21°)

Analyzing data from Table 3 are found close to but slightly higher values than those recorded in variant A of forcing, both in terms of vegetative growth components and elements

of flowering. In general, the hierarchy is preserved varieties for each of these elements. Thus, the number of leaves is the minimum (6.2) the varieties '*Peter Stuyvesant*', '*Blue Jacket*' and '*Delft Blue*' and maximum (7.6) the variety '*City of Haarleem*'. Leaf length ranges from 16.3 cm to the variety '*Peter Stuyevesant*' and 35.8 cm from the variety '*Anne Marie*'. Floral stem length varies from 24.1 cm to the variety '*Peter Stuyevesant*' and 33.6 cm from the variety '*Delft Blue*'. The minimum number of flowers in bloom (23.2) meets the variety '*Splendid Cornelia*' and the maximum number (36.2) the variety '*Blue Jacket*' (Photo 6).

Table 3. The final values of vegetative growing and flowering of plants from variant B of forcing

Variety	Leaves number	Lenght of leaves (cm)	Lenght of steam flower (cm)	No. of flowers in inflorescence
<i>SPLENDID CORNELIA</i>	6,4	24,2	24,5	23,2
<i>BLUE JACKET</i>	6,2	18,6	28,4	36,2
<i>SKY JACKET</i>	6,6	30,6	32,8	30,3
<i>ANNE MARIE</i>	6,4	35,8	27,2	23,5
<i>FONDANT</i>	5,8	25,2	32,4	33,8
<i>DELFT BLUE</i>	6,2	20,8	33,6	33,2
<i>CARNEGIE</i>	7,4	27,3	29,4	34,8
<i>CITY OF HAARLEEM</i>	7,6	18,8	28,5	26,7
<i>PETER STUYEVESANT</i>	6,2	16,3	24,1	30,4



Photo 6. The flowered plant from '*Blue Jacket*' variety in variant B of forcing

Like the previous version to force, meet a linear correlation, direct and very strong only between weight and number of bulbs used in planting flowers in bloom (figure 2).

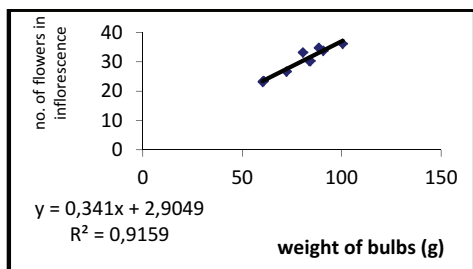


Fig. 2. The correlation between the weight of bulbs and number of flowers in inflorescence from variant B of forcing

C. Forcing directly in soil greenhouse (21°)

From Table 4 we find that, in general, ranking keeps forcing varieties from previous versions in terms of values of elements increases vegetative and flowering.

Table 4. The final values of vegetative growing and flowering of plants from variant C of forcing

Variety	Leaves number	Length of leaves (cm)	Length of stem flower (cm)	No. of flowers in inflorescence
<i>SPLENDID CORNELIA</i>	6,5	30,5	26,5	28,4
<i>BLUE JACKET</i>	7,8	23,6	29,8	43,2
<i>SKY JACKET</i>	7,2	34,2	34,2	34,4
<i>ANNE MARIE</i>	6,6	37,3	30,3	25,2
<i>FONDANT</i>	7,2	25,4	31,5	35,7
<i>DELFT BLUE</i>	6,2	18,4	35,2	38,4
<i>CARNEGIE</i>	7,6	30,1	32,6	35,6
<i>CITY OF HAARLEEM</i>	7,6	19,1	26,9	30,6
<i>PETER STUYEVESANT</i>	6,1	16,3	27,7	33,3

With few exceptions, these values are higher, which is explained by the fact that the bulbs were given a greater amount of nutrition.

Observe, such as minimum number of leaves (6.1) meets all the variety '*Peter Stuyevesant*' and the maximum number (7.8) is registered in the variety '*Blue Jacket*'.

Leaves are the minimum length (16.3 cm) from the variety '*Peter Stuyevesant*' and maximum (37.3 cm) from the variety '*Anne Marie*'.

The short flower stem (22.5 cm) occurs in the variety '*Splendid Cornelia*' and the long (35.2 cm) from the variety '*Delft Blue*' - Photo 7.



Photo 7. The flowered plant from '*Delft Blue*' and '*Splendid Cornelia*' variety in variant C of forcing

Variety '*Anne Marie*' is distinguished by the lowest number of flowers in bloom (25.2) followed by variety '*Splendid Cornelia*' (28.4). As with previous versions of compulsion, the largest number of flowers in inflorescences (43.2) to register the variety '*Blue Jacket*' - photo 8.



Photo 8. The flowered plant from '*Blue Jacket*' variety in variant C of forcing

Analyzing correlations between elements of the vegetative growth and flowering was found that only linear correlation, positive and very strong, is found all between weight and number of flower bulbs in bloom (Fig. 3).

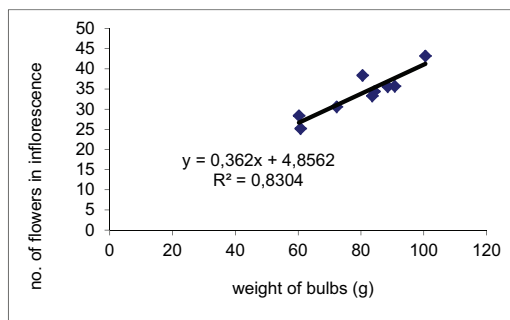


Fig. 3. The correlation between the weight of bulbs and number of flowers in inflorescence from variant C of forcing

D. Forcing in a vases with water located in forcing room (8-9 °C)

The data analysis presented in Table 5 notes that about elements increases vegetative variety hierarchy remains almost unchanged, at least the minimum and maximum limits.

Table 5. The final values of vegetative growing and flowering of plants from variant D of forcing

Variety	Leaves number	Length of leaves (cm)	Length of stem flower (cm)	No. of flowers in inflorescence
<i>SPLENDID CORNELIA</i>	6,2	21,3	25,1	25,6
<i>BLUE JACKET</i>	8,0	24,8	27,3	40,3
<i>SKY JACKET</i>	7,2	32,4	31,8	32,2
<i>ANNE MARIE</i>	6,7	25,2	25,3	25,0
<i>FONDANT</i>	7,0	28,2	29,9	33,6
<i>DELFT BLUE</i>	6,4	18,9	29,8	36,5
<i>CARNEGIE</i>	6,6	20,4	23,2	33,4
<i>CITY OF HAARLEEM</i>	6,8	16,9	24,3	29,2
<i>PETER STUYEVESANT</i>	6,0	14,6	24,5	32,5

Thus, the number of leaves varies between 6.0 to variety '*Peter Stuyevesant*' and 8.0 cultivar '*Blue Jacket*'.

Leaf length is 14.6 cm values between the variety '*Peter Stuyevesant*' and 32.4 cm from the variety '*Sky Jacket*'.

About elements that are found flowering variety '*Carnegie*' presents the minimum length of flower stems (23.2 cm) followed closely by the variety '*City of Haarleem*' (24.3 cm) - photo 9. A short length of flower stem is an advantage for this type of forcing it allows greater stability vase. Number of flowers in bloom is minimal (25.0) the variety '*Anne Marie*' followed closely by the variety '*Splendid Cornelia*' (25.6) and maximum

(40.3) the variety '*Blue Jacket*' followed by variety '*Delft Blue*' (36.5) - Photo 10.



Photo 9. The flowered plant from '*City of Haarleem*' variety in variant D of forcing

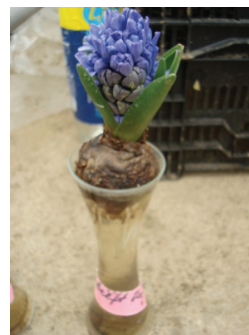


Photo 10. The flowered plant from '*Delft Blue*' variety in variant D of forcing

And for this option to force linear correlation is confirmed, direct and very strong between weight and number of flower bulbs in bloom (Figure 4). Analysis graphs relating to variation of flowering and vegetative growth elements in terms of forcing hyacinths highlight, with few exceptions, close hierarchy of varieties for each of the four variants to force tested (Fig. 5-8).

These graphs highlight that, overall, the best option to force soil was directly forcing greenhouse.

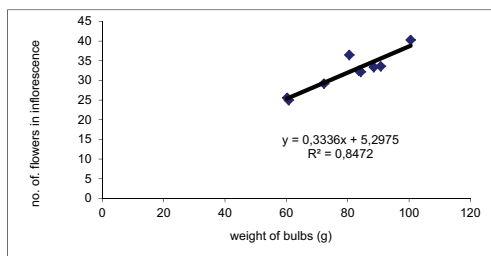


Fig. 4. The correlation between the weight of bulbs and number of flowers in inflorescence from variant D of forcing

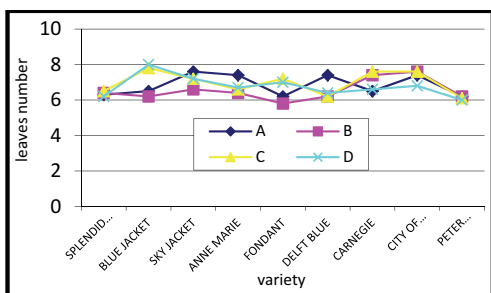


Fig. 5. The variation of leaves number in all the four variants of forcing

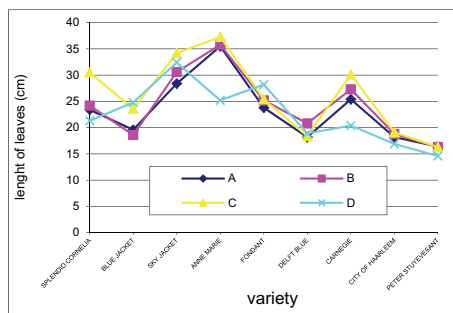


Fig. 6. The variation of length of leaves in all the four variants of forcing

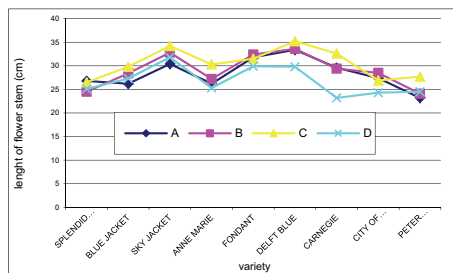


Fig. 7. The variation of length of flower stem in all the four variants of forcing

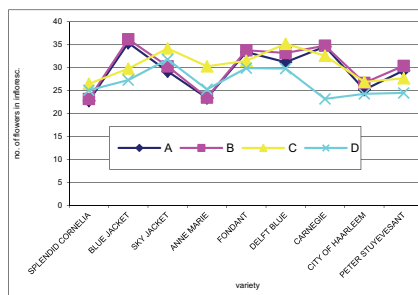


Fig. 8. The variation of number of flowers in inflorescence for all the four variants of forcing

CONCLUSIONS

The best option to forcing was the period of cold that was applied before planting bulbs and cold treated bulbs were planted directly in soil greenhouse.

Forcing results in a vase with water to follow closely the values obtained for directly forcing greenhouse soil in pots while forcing led to the worst results. The quality of floral stems and flowers was superior varieties, 'Blue Jacket', 'Sky Jacket' and 'Delft Blue' while 'Splendid Cornelia', 'Anne Marie' and 'Carnegie' varieties were marked by the lowest values of the elements flowering.

These results shows that the hyacinth, in cultures forced, cold therapy has maximum effect when applied before planting bulbs planting bulbs and previously treated with cold soil is directly in the greenhouse.

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