

TECHNOLOGICAL SOLUTIONS AND INDOOR USE OF FORCING BULB PLANTS

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Abstract. *The flower bulb plant variety (such as daffodils, crocuses, hyacinths, tulips and others) can have a hugely attractive effect on any garden or indoor design. This paper presents the benefits of indoor utilization of bulb and rhizome plants decor, such as Narcissus, Tulipa, Cyclamen, Crocus, Amaryllis, Convalaria, Fritillaria, Hyacinthus and most importantly, the technological process of forcing the bulbs to produce plants during winter, or early spring, in a season when flower decoration is quite poor. The thermal “cold” treatment and the subsequent care methods, but also the required tools and accessories will be revealed. In addition to that, this paper offers details about an alternative culture method, such as the hidroculture and its techniques.*

Keywords: ornamental plants, thermal forced culture, hidroculture, plant associations.

INTRODUCTION

Millions of bulbs are purchased every year and these species are essential components in outdoor or indoor landscaping, by decorating with their perfume and unique color palette, in periods when few other plants can do it. No other plants can match the aesthetic, cheerful effect of bulb and rhizome flowers (Brennan *et al.*, 1993). Genres like *Narcissus, Tulipa, Cyclamen, Crocus, Amaryllis, Convalaria, Fritillaria, Hyacinthus*, thanks to the splendid color effects that they produce, have the quality to decorate homes, offices, festive halls during the winter, just as decorative plants range is reduced (Cantor *et al.*, 2007). Bulb plants destined to interior decoration are doing more than bringing light and color in the design of a room. They offer real health benefits, by producing oxygen, but also generate a positive influence on the human mental tone, using their shape, color, scent, especially since these plants are the ambassadors of spring and joy. Therefore, in addition to the rich contribution these species have in maintaining the clean air, they also can reduce headaches, stress, symptoms related to heart diseases and colds. In order to enjoy the benefits of bulb and rhizome plants in our homes during winter, it is essential to use the forced culture technology that stimulates bulbs and rhizomes to develop faster, using thermal (the “cold” treatment - for bulbs, or mechanical methods - for rhizomes). For this kind of culture it is vital to have room temperature and brightness control, storage facilities, utensils, containers and never the less, passion for beautiful plants (Della Beffa, 2007).

MATERIAL AND METHOD

In terms of lifetime, bulb and rhizome plants are perennials, which mean they live several years, but they bloom and produce fruits every year. They also go

through a rest period of vegetation, determined either by low temperatures during winter (*Canna*, *Gladiolus*), or by excessive heat in summer (*Tulipa*, *Narcissus*, *Hyacinthus*). This important period influences the blooming. The success of the indoor flower culture depends on how biological traits are known and respected. Knowing them is of a crucial importance in the technology of cultivation, in order to produce spectacular results.

The forcing bulbs technology is ensured exactly by the very structure of bulbs, which contain all the nutrients needed for the growth and development cycle (Fig. 1). To avoid confusion concerning the name of "bulb", morphologically, these elements are underground stems and mainly belong to perennial flower plants. They are the metamorphosed organs, adapted to ensure the backup storage of nutrients, for the vegetative propagation and most importantly, they provide resistance to adverse environmental conditions. With their shape and sizes, sometimes resembling to the classical roots, they are characterized by the presence of buds, next to some rudimentary leaves, and also having specific anatomical libero-wood channels.



Fig. 1. Left: example of hidroculture of *Crocus* bulb; Right: *Tulipa* bulb, regarding the bulb's nutrient storage

The whole process starts in autumn, by choosing high quality bulbs. They are planted in early October to mid November, and then the pots are placed in special facilities where the low temperature and light conditions can be assured. After the right period of time, the plants are gradually facing higher temperature and light conditions in order to stimulate the blooming process.

Planting depth varies depending on the particular species and the roots characteristics and is a very important detail to the proper development of the roots (10-15 cm depth for gladioli and tulips, 10 cm depth for narcissus, 5-6 cm depth for crocus). The bulb planting depth should usually be about twice their height.

RESULTS AND DISCUSSION

The cold treatment key is keeping the bulbs at temperatures of 5 °C for 10-15 weeks, depending on the species (Table 1). The pots with the planted bulbs should be held either outside in ditches, protected by a layer of straw or leaves, or in different facilities (basements, warehouses, garages). During the cold storage must be avoided placing bulbs near fruit or vegetables, because they generate ethylene, a harmful substance for the already formed flowers, inside the bulb. Before being placed in the cold, the bulbs should get a fungicides and pesticides treatment. Nevertheless, to avoid any unwelcome disease, it is highly recommended that bulbs should have the benefit of their own refrigerating room.

Table 1

Morphological characteristics of bulbs regarding cold treatment duration, planting depth for an early spring blooming

Species	Bulb size (cm)	Planting period	Planting depth (cm)	Cold treatment duration (weeks)	Blooming period, after the cold treatment
<i>Tulipa gesneriana</i>	10-12	October	15	12-14	4-6 weeks
<i>Narcissus poeticus</i>	2-4	November	10	12	2-3 weeks
<i>Hyacinthus albus</i>	10	November	10-15	12	3-4 weeks
<i>Muscari armeniacum</i>	8	November	5-6	6-8	3-4 weeks
<i>Crocus aureus</i>	6	November	5-6	4-8	4 weeks
<i>Amaryllis belladonna</i>	10-12	October	15	12-14	6 weeks
<i>Crococsmia x crocosmia</i>	8	November	5-6	10-12	4-6 weeks
<i>Colchicum autumnale</i>	3-4	November	8	10-12	4 weeks

Also, the temperature in the refrigerator or storage room must be 5⁰C, not less, therefore, it is always recommended to check the temperature with a thermometer. Bulbs shouldn't be placed in the freezer at temperatures below 0⁰C or in plastic bags. The air must circulate around them. When time comes for the pots to be removed from the cold storage, it is highly necessary to check the root development stage. If the roots penetrated the pot drainage holes, it means that they have formed the proper root system.

In the next development phase, the sun and temperature are the most important factors for the bulbs to bloom. Most bulbs need about 3-4 weeks from the moment they were removed from the cold storage, to bloom. If the flowering process is going too fast, the inconvenience can be removed by moving the pot from light, in a cool shady place, and this way the flowering period will be extended.

After removing the bulb pots from cold storage, they should be kept in bright rooms at a temperature of 10-16⁰C, for further growth and development of plants. As the plants grow, the pots should be repositioned, gradually at even warmer temperatures (16-20⁰C). But when flower buds appear, the bulb pots should be placed again, in a colder storage, especially at night, in order to extend the flowering period (Selaru, 1980). Also, the soil moisture should be constant throughout the period of flowering. Most bulb plants will bloom within 3-4 weeks after their introduction to warmer and sunnier storage. If the blooming is delayed, a few days with higher temperatures will be effective for faster development.

In the flowering phase, the decoration should last about 7-10 days, if the forcing treatment was done properly. The best results are gained by keeping the plant in a cool place at night and providing a constant soil and air moisture, and nevertheless, by placing them, during daytime in direct sunlight. At the end of the flowering period, bulbs can be planted outdoor, in order to bloom in the coming year. Bulbs cannot be forced two consecutive years.

Hydroculture is another method which can be use for forced bulbs and represents a method of growing plants without the use of soil (6). When the hidroculture technique is chosen in order to force bulb plants, special glass pots are required. They are filled with water, which can be renewed now and then, but with

the caution of not injuring the fragile roots. The water must be at the suggested level, which usually the pot producers recommend, with the mention that the bulb should never come in contact with the water, it should be always above the liquid, for it not to rot, only the root extensions should reach into water (Fig. 1).

The bulb glass pots should also be kept at a lower temperature (preferably below 10°C) and in shady storage for a period of 4-8 weeks, until roots have completely developed and plant growth can continue. Later on, the plants need to be stored next to a sunny window, at a higher temperature, of 18-20°C, in order for the plants to bloom. At this point the water level should be all the way up to the bulb. When forcing the bulbs in water, after the flowering period passes, the bulb can no longer be used for another flowering cycle, because it has already used all the nutrient resources.

Plants destined to indoor decoration, including bulb plants should be associated according to their morphological characteristics such as (leaves: shape, texture, color, size; flowers, figure, height), blooming period, environmental conditions claims. Mainly, there are three classic methods of indoor flower plants associations, such as: individual planting (consisting of pots with 1-3 plants of the same species), uniform groupings (consisting of more than 3 plants from the same species, in one or more colors).

However, the most recommended method for arranging bulb plants is the multi level groupings, which consist of a number of multicolored plants, of different sizes and shapes, which are mixed in a charming way (Negruțiu, 1980). This method requires special pots and choosing the species depending on the period of flowering, size at maturity.

In order to achieve the maximum effect, one must know some very important details about the bulb plants, such as bulb dimensions, planting depth, blooming duration and timing; so that all plants bloom from an arrangement take place simultaneously. The composition of a bulb flower decoration can be symmetrical or asymmetrical. Most successful in terms of aesthetics are asymmetrical compositions that offer a greater degree of dynamics, diversity and authenticity. Symmetry generally gives the impression of quiet monotony.

Dynamics can also be generated by the heights, which can be different or uniform. Also it is very important to use good varieties for forcing (7): *Tulipa*: 'Apricot Beauty', 'Bing Crosby', 'Jingle Bells', 'Attila', 'White Dream', 'Princess Irene', 'Monsella', and 'Estella Rijnveld'. *Hyacinthus*: 'Amethyst', 'Blue Jacket', 'Jan Bos', 'L'Innocence', 'Pink Pearl', 'Delft Blue' and 'Carnegie'. *Narcissus*: 'Barrett Browning', 'Bridal Crown', 'Dutch Master', 'Ice Follies', 'Salome', 'Pink Charm', 'Tete-a-Tete', 'Jenny', and 'Cheerfulness'.

CONCLUSIONS

Among the many possibilities of interior flower decorations, bulb and rhizome plants are highly preferred in people's homes, as they are the spring ambassadors, characterized by cheerful colors, small and cute sizes, a real rush of joy with a modern touch, offered by the hidroculture option with the nice, elegant, glass pots. The great advantage of these species is the possibility of forcing the

underground organs, in order for these plants to decorate all year round, including in winter, the poorest flower season.

Forcing is a technique that imitates the environmental conditions that bulbs encounter outdoors, thereby tricking them into flowering earlier. Most bulbs need a chilling or a cold treatment period to flower successfully and put on their best show. Different types of bulbs require different chilling periods, generally between 12 to 16 weeks. Bulbs will perform well as long as they have had the minimum time that they need.

Finally, the key to achieving successful interior bulb and rhizome plants decorations is to respect a few details such as: choosing high quality bulbs and good varieties, choosing the right position for the pot; with sun direct exposure and constant temperature; planting period; planting depth; proper watering, depending of the vegetation period of the plant; nevertheless, making a smart, elegant plant association.

On the bases of our experiment we can do some recommendations for the growers of forcing bulb plants: Plant containers from early October to mid November; Select a pot that has drainage holes. If you would like to display your bulbs in ceramic containers with no drainage holes (cache pot), you can plant the bulbs in a plastic pot and slide it into the ornamental container when ready for display; Since the bulbs are in the containers for such a short time, fertilizer feeding is not essential. They generally have enough energy stored in the bulb; Plant bulbs closely together in pots to create a full container, but give them enough space so that they are not touching each other. Plant bulbs with the pointed end facing upwards, Cover bulbs so that they are just below the soil surface. After you water, the soil level will settle so that the tips of the bulbs are just poking above the surface; Label your pots with the variety of bulbs and the time of planting; Water the pots thoroughly and if you use terra-cotta or plastic pots, water carefully so that they do not become waterlogged.

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