



PRODUCING HYACINTHS FOR CUT FLOWERS

PRACTICAL TIPS FOR

- ▶ CHOOSING THE RIGHT BULBS AND BULB TREATMENT
- ▶ SUCCESSFULLY SCHEDULING AND IMPLEMENTING PRODUCTION
- ▶ THE PRODUCTION OF HIGH-QUALITY FLOWERS
- ▶ WORKING ON A GOOD KEEPING QUALITY FOR SATISFIED CONSUMERS





Programmed bulbs for on-schedule production

Choose the right bulb size

To obtain hyacinth flowers of good quality, it is important to use the right bulb size. Bulb sizes (the circumference of the bulb in centimetres) 15/16, 16/17, and sometimes 17/18 will provide the best results.

Decide well in advance of production period

The bulbs will have to be prepared (receive special treatment) before being used for production so that they can be forced into flower at a specific time. This is why it is important to contact your supplier about this requirement 6-12 months in advance. In this way, the supplier can take measures to ensure that the bulbs can flower at the time you want.

Programming with heat and cold

To be able to force the bulbs into flower early, they need to undergo a warm storage period during the summer followed by a period of low temperature. This is why all hyacinth bulbs, after being lifted, are subjected to a special heat treatment during which the new leaves and parts of the flower are initiated. Bulbs destined for earliest forcing can then begin their cold period. Bulbs to be used for later forcing periods will have the heat treatment extended so that their cold period can start later. The dry bulbs are usually planted before receiving their cold treatment. The cold period for hyacinth bulbs being used for cut flower production has to be 3 to 4 weeks longer than bulbs being produced for pot plants. This is done to obtain longer stems.

Plant soon or provide proper storage

It is best to plant the bulbs immediately after receipt because the bulbs are then ready to start rooting. Due to the risk of Penicillium, it is definitely not a good idea to leave hyacinth bulbs for very long in their packaging or to put them away in a cool, humid room. If the bulbs cannot be planted immediately, then they must be stored in a dry room with plenty of air circulation at 17 to 20°C. Storage at lower temperatures (13°C, for example) will not harm the bulbs but increases the risk of Penicillium. If in doubt, consult your supplier.

Forcing containers

In the Netherlands, large boxes (100 cm. x 150 cm. and about 15 cm. deep) made of treated wood are used to contain the bulbs being placed in plunge beds outside. The boxes or containers used in indoor rooting rooms have projections measuring about 10 cm. that are located on the upper side of the container. These projections allow the containers to be stacked and leave enough space between them for shoots to grow without being hindered by the container/box above. Plastic boxes (60 cm. x 40 cm. and 18 cm. deep) with these projections are also used.

Other box sizes can be used, as long as the bulbs can be planted on more than 5 cm. of soil and covered with about 5 cm. of sand.

If large boxes are used, they are pulled from the plunge bed with a tractor, placed on tubing or pallets, and taken to the greenhouse by, for example, a forklift.





Effective control of temperature for best results

Using a plunge bed outside: taking advantage of climate conditions

The boxes are filled outside and then put into plunge beds and covered with soil available at the site. This is usually well-draining sandy soil. Hyacinths are vulnerable to frost damage. If temperatures at the depth of the bulbs drop to less than -1°C for any length of time, they can freeze. This is why a mulch material such as straw is put on top of the plunge beds. Prevent mice damage by mulching. When using a plunge bed outside, the entire cold treatment must be provided by natural climate conditions. For a good start, a soil temperature around 9°C is best. Planting at a temperature higher than 13°C is not a good idea because of a reduced cold effect and greater risk of diseases such as *Erwinia* and *Fusarium*. As the temperature in the plunge bed continues to drop below 9°C , the effect of the cold treatment is reduced so that the cold period will have to be extended.

Rooting room: regulating with temperature

The containers are filled with a layer of potting soil 7-8 cm deep, planted and covered with sand. The planted containers are stored in stacks in a dark refrigerated rooting room. This is where the bulbs root and where they will remain for as long as necessary to complete their cold period. The advantages of using a rooting room are the possibility of using mechanisation for planting, better scheduling of labour and flowering period.

A planting medium is usually made from potting soil with 15 to 25% sand added. This composition is used because the

soil in the containers cannot be too light; otherwise, pulling a hyacinth out during harvesting could result in pulling out neighbouring plants as well. This composition also keeps the soil from remaining too wet over a long period. The potting soil must be fresh and free of pathogens. The best pH is 6 to 7; the EC should be less than 1.0.

Keep an eye on development

After planting, the boxes should be watered until the soil is wet but not entirely saturated. As long as the boxes are kept in a rooting room with a high RH, this will eliminate having to water again before housing. Keeping the soil from drying out can also be accomplished by maintaining the highest possible RH (95%). One way of doing this is to wet the floor of the rooting room once in a while.

As hyacinth bulbs take root, the roots can push the bulbs upward so far that they rise up out of the soil. This is why it is necessary to place a layer of sand at least 3 cm thick or strips of foam rubber on top of the planted bulbs. The foam rubber should fit exactly between the stacked containers in order to prevent the bulbs from rising. The later in the forcing season that the hyacinths are planted, the greater this root pressure can become, and thus the greater the risk that the bulbs will rise up out of the soil. Once the bulbs have rooted properly, the foam rubber should be removed to give the shoots room to continue growing. The foam rubber will then be available for the hyacinths scheduled for the next forcing period. Also be sure to keep any roots descending from the containers above from growing into the foam rubber.





Plant with care for a good start

Adjust planting density to bulb size

Planting density depends primarily on the bulb size. The bulbs are usually planted not in a grid pattern but in closely fitting staggered rows to get as many as possible into a container. The only bulb size requiring a bit more space is 14/16. The diagram below can be used as a guideline:

BULB SIZE IN CM.	AVERAGE NUMBER OF BULBS/NET M ²
17/18	300
16/17	350
15/16	375
14/15	400

Plant according to flowering period

The time to plant depends on the desired flowering period. An early forcing period requires early planting. Planting bulbs later can also be done for a later forcing period (see the table with cold periods in weeks/cultivar). When using a plunge bed outside, soil temperature determines the time to plant. In rooting rooms, the temperature can be controlled so it is possible to plant batches that were prepared especially for the early forcing period very early. This is not always possible when planting outside. In some years, the soil temperatures outside are still too high for this. If planted then,

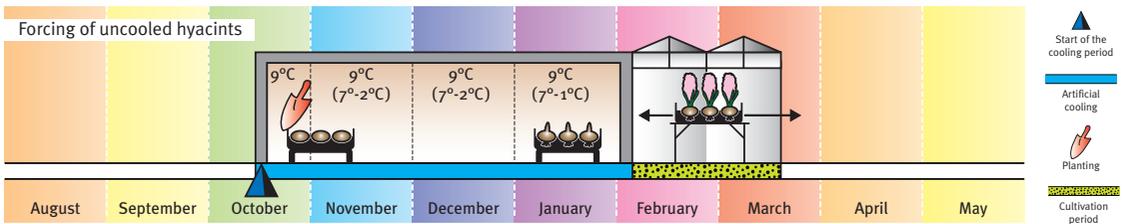
the cold period may not be long enough and there will also be a greater risk of diseases. The best soil temperature for planting is about 9°C. A few weeks at a slightly higher temperature, as long as it does not exceed around 13°C, will not usually result in any harm.

Planting all the batches before the first half of November can be done but this will result in much longer cold periods for late forcing and will require reducing the temperature in the rooting room on time.

Optimum rooting takes place at 9°C

Rooting is best accomplished at 9°C, although a slightly lower temperature can be applied later in the season. The optimum temperature during the cold period is 9°C. This is the temperature at which the number of cold weeks for optimum flowering is based. If the temperature during this cold period is higher or lower than 9°C for any length of time, the cold period will have to be extended. Either an excessively high temperature or an excessively low temperature will mean adding time to the required cold period.

At a constant temperature of 9°C, the shoots can become too tall. If it looks as if this might happen, the temperature can be lowered, but it should not decrease to a temperature lower than around 0 to 1°C. This lower temperature keeps the shoots from touching the containers above them.





Every cultivar responds in its own way

Various cultivars are suitable for producing hyacinths as cut flowers but they can vary slightly with regard to how many cold weeks they require and when they should be housed. Here is a list of the most important cultivars with their minimum number of cold weeks (based on planting at 9°C).

Cold periods in weeks/cultivar

CULTIVAR	HOUSE BOXES UNTIL	HOUSE BOXES FROM	HOUSE BOXES FROM	HOUSE BOXES FROM
	17 DECEMBER	17 DECEMBER TO 24 JANUARY	24 JANUARY TO 24 FEBRUARY	24 FEBRUARY TO 24 MARCH
Aiolos	14	13	13	12
Anna Liza	13	12	10	10
Anna Marie	13	12	10	10
Antartica	13	12	10	10
Atlantic	13	12	10	10
Blue Jacket	•	14	13	13
Blue Pearl	14	14	13	13
Blue Star	14	14	13	12
Carnegie	•	14	14	14
China Pink	14	13	13	12
Delft Blue	14	14	13	12
Fondant	15	14	14	13
Gipsy Princess	•	•	15	14
Gipsy Queen	•	•	15	14
Jan Bos	•	13	13	12
L'Innocence	13	10	10	10
Minos	14	14	13	12
Ostara	13	12	12	11
Peter Stuyvesant	•	13	13	12
Pink Pearl	14	14	13	13
Purple Sensation	14	14	13	13
Purple Star	14	14	13	12
Sky Jacket	•	13	13	12
Splendid Cornelia	•	12	12	11
Top White	•	12	12	11
Violet Pearl	14	14	13	13
White Pearl	14	14	13	13
Woodstock	•	13	13	12

• = This cultivar is not suitable for housing in this period but can be used for flowering later.

Before arriving at the grower's location, the hyacinths have already been subjected to the required interim temperature treatment following flower initiation. This takes place at the supplier's location.

Production characteristics can vary considerably among the cultivars. Some are more difficult to force. Be sure to consult with your supplier about this.



HYACINTHUS 6



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Schedule flowering yourself depending on the storage temperature used

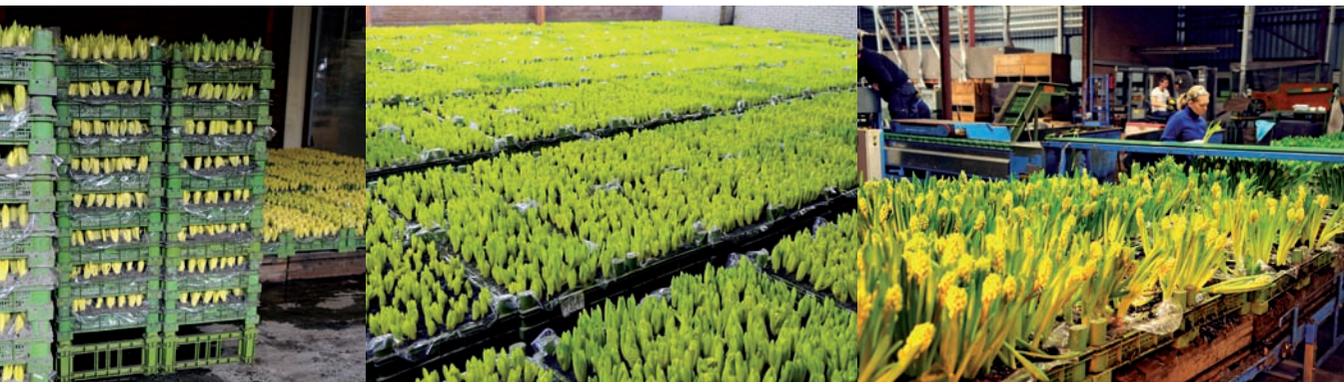
Schedule flowering periods yourself

Setting up a forcing schedule can be done as based on the listed cold periods. If a grower wants to harvest hyacinths for cut flowers on 8 March, he will have to subtract the forcing period and the cold period to arrive at the right planting date (or the date on which the cold period will begin). If the forcing period will last until the end of harvest (2 weeks, for example) and the cold period required by that cultivar is 13 weeks, the bulbs will have to be planted 15 weeks before the desired flowering period. If the bulbs are receiving their cold period outside in a plunge bed where there is a good chance of much lower temperatures, or if the temperature in the rooting room will be set lower than 9°C for any length of time (to limit shoot growth, for example), another 1 to 3 weeks will have to be added to the cold period. In such a case, the bulbs will have to be planted 16 to 18 weeks before the desired date. Either an excessively high temperature or an excessively low temperature will require adding time to the necessary cold period to achieve good uniform flowering with stems of sufficient height.

If a grower wants to produce hyacinths for cut flowers throughout a large part of the winter, he must ensure that bulbs are planted and housed every week. Another option is to assign all the hyacinths produced for cut flowers a fixed cold period of 14 weeks to allow for weekly planting and housing. Yet another solution is to try and plant everything in November and then house the containers holding shoots that are tall enough by transferring them to a rooting room set at 1°C before they get too tall. Early in the forcing season, the greenhouse period for hyacinths being produced as cut flowers lasts about two weeks; at the end of the season, this is less than a week.

The best greenhouse conditions

Hyacinths can be forced into flower with relatively little light. Most greenhouses will be suitable for forcing them. It is important to make sure the greenhouse does not admit too much light because this can result in flowers maturing too quickly. If the greenhouse is kept cooler during the last phase of forcing, flowers will be less likely to mature too quickly and their colour will be more intense. In the Netherlands, hyacinths are also forced in sheds or “bulb-forcing rooms” using TL lighting. Hyacinths can also be forced successfully under conditions of higher humidity (up to 85 – 90%). Greenhouses with extra insulation in the form of double-glazing, plastic film, etc. can be used to conserve energy. Hyacinths can be watered from above the crop. A greenhouse temperature of 18°C is favourable for flower development and sufficient stem height. Higher temperatures result in shorter stems and earlier flowering. Lower temperatures produce taller stems and later flowering, and the flower often sits too far down among the leaves. This is why a heating source located beneath the crop (in-bed pipes, floor heating or pipes running beneath the benches) is often used as the primary source of heat. The flowers then grow taller than the leaves. To make harvesting easier, the boxes or containers are placed off the ground, preferably on benches, or on tube constructions in the greenhouse.





A flower attached to the base of its bulb has a longer vase life

Proper harvesting for good flower development and keeping quality

Hyacinths produced for cutting are harvested by pulling the plants, bulb and all, from the soil. The hyacinths are ready to harvest when the flower cluster is showing definite colour and at least one of the bells has separated from the cluster. The next step is to cut the plant out of the bulb and leave the base of the bulb attached. With the base of the bulb still attached, the plant develops better flowers. This also improves keeping quality. There are several kinds of bulb-removing machines that can be used to more or less mechanise this process. In the Netherlands, hyacinths used as cut flowers are bunched five to a bunch and held together with tape or rubber bands. Before packaging, it would be advisable to rinse off any soil residue with clean water. The bunches can then be placed either dry or in a container with a few millimetres of water for up to three days in a refrigerated storage maintained at around 2 to 5°C. Hyacinths with bulbs attached can also be placed in refrigerated storage in an upright position (to prevent crooked growth). Consumers

should also be advised not to trim the stems from these hyacinths but to leave the base of the bulb attached.

Flower quality and grading requirements

The Dutch Flower Auctions Association (VBN) advises stage 3 as a good flowering stage (see photo of harvesting stages). In this stage, the lowest bells in the cluster are not pressed up against the stem and are displaying good colour. Flowering is uniform and free of defects. Every stem has at least 4 green leaves, the tips of which must not extend above the flower cluster. The base of the bulb must be attached to all the stems.

These hyacinths are graded according to length, cluster size and maturity. A mixed bunch is made up of at least three colours. Hyacinths are bunched five stems to the bunch and five bunches to a bundle. The bundle is rolled up in paper and put into containers holding a shallow layer of water so that they can absorb enough water to be transported dry and in an upright position to the point of sale.





Proper hygiene prevents problems

The production of hyacinths for cut flowers usually runs smoothly. Many problems can be prevented by the proper choice of material and the proper treatment of the bulbs before and during production. This diagram shows the most important diseases and how to deal with them. Using preventive measures reduces the risk of major damage.

CAUSE		SYMPTOMS	PREVENTION/CONTROL
Rhizoctonia solani (a soil fungus)		Leaves more or less eaten away, rotting of bells on the flower cluster. Fine hypha often found between the leaves and on the flower cluster	Use fresh potting soil and clean sand for covering the bulbs. Do not cover with humic soil but with fresh clean sand.
Penicillium (a green fungus)		Plants displaying poor or uneven rooting. This disease always begins due to excessively moist conditions during storage.	Do not damage the bulbs, and be sure to plant them immediately upon arrival. Store bulbs under properly ventilated, dry conditions.
Pythium (a soil fungus)		The rotting of roots results in plants that remain too short and do not flower properly.	Use fresh soil. Disinfect previously used containers by, for example, steaming or treating with hot water.
Erwinia (bacteria)		Wet, dark green spots on leaves and flower stem that start at the base of the bulb and extend upward. The plants have an unpleasant odour.	Plant at 9°C, not at higher temperatures. Do not plant under wet, warm conditions.



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