



GROWING HYACINTHS AS POT PLANTS

PRACTICAL TIPS FOR:

- ▶ CHOOSING THE RIGHT BULBS AND BULB TREATMENT
- ▶ SUCCESSFUL FORCING AND SCHEDULING
- ▶ PRODUCING POT PLANTS OF HIGH QUALITY
- ▶ SUCCESSFUL SALES





Bulbs programmed for effective production scheduling

Select the right bulb size

The usual bulb sizes (circumference measured in centimetres) used for forcing in pots are 16/17 cm, 17/18 cm, 18/19 cm and even 19/- cm, although smaller sizes are sometimes used when planting more than one bulb to a pot. The larger the bulb, the more florets in the flower cluster and the greater the chance that the bulb will produce another smaller flower stem later. The number of florets/cluster also depends very much on the cultivar. Pink Pearl and Delft's Blauw, for example, produce more florets than Anna Marie and Blue Magic. Other factors influencing the number of florets are the production conditions, age/lifting date and temperature treatment.

Traditionally, many pot hyacinths were forced to flower during the period before Christmas. These days, the season stretches from mid-October to their natural flowering period in March/April. Providing the bulbs with the right temperature treatment is important for good results. For this reason, order them from your supplier in plenty of time: preferably 6 months, but, even better, 12 months in advance.

Decide on the production time in advance

After lifting, the bulbs have to undergo a special heat treatment during which the new leaves are initiated and then the flower parts. Once the last florets in the tiny cluster inside the bulb are initiated, stage G has been reached. Then, after receiving a brief intermediate treatment, the bulbs can start their cold period. Bulbs intended for later forcing periods are held for a longer time under warm

conditions so that the cold period can start later. The bulbs almost always spend this cold period planted in pots placed in rooting rooms or outside on a standing ground. When being produced as pot plants, hyacinths receive a relatively short cold period to keep the shoots short and to produce pot plants with a compact habit. Due to this shorter cold period, pot hyacinths can be housed earlier than hyacinths produced for cut flowers since the latter require a much longer cold period. The forcing of pot hyacinths can be advanced even more by using very early bulbs from countries such as France, or bulbs grown in the Netherlands that have been lifted very early. By using early cultivars that have been lifted earliest in the Netherlands, pot hyacinths can be harvested as early as mid-October. These early bulbs will cost more to purchase.

Best to plant immediately

It would be advisable to plant the bulbs immediately upon receipt. This is because the bulbs are ready to produce roots. It is very inadvisable, due to the risk of infection from *Penicillium*, to let the bulbs remain for any length of time in their packaging or to put them in a cool damp room. In the unlikely event that the bulbs cannot be planted, they must be stored in a dry room with a high air circulation rate and at a temperature of 17 to 20°C. Storage at a lower temperature such as 13°C, will not harm the bulbs, but involves a higher risk of *Penicillium* developing. If in doubt, consult with your supplier.





Control temperature properly for best results

Various forcing methods

Pot hyacinths can be forced in various ways; the choice depends mainly on the way the bulbs have received their cold period.

Using a standing ground outside: taking advantage of climate

For centuries, this was the usual forcing method. In more recent times, however, the more favoured method involves storing the pots in air-conditioned chambers (rooting rooms).

When using small pots filled with potting soil and planted with bulbs, the pots are then placed in plastic or wooden boxes that are put into or onto the standing ground. When using larger pots, the same method is used but without the boxes; the pots are simply buried directly into the standing ground. A layer of soil about 5 cm deep is used to cover the bulbs to prevent them developing roots from pushing them upward.

When choosing the location for a standing ground, it is important to have a soil with a good permeable structure and good drainage. Soil used for forcing hyacinths must not have been used previously for hyacinths and must be free of pathogens such as *Rhizoctonia solani* and *Pythium* that could infect hyacinths.

Hyacinths are susceptible to frost damage. Being subjected to temperatures lower than -1°C at the depth of the bulb for any length of time can ultimately freeze the bulbs and their roots to the point of falling off. To prevent this frost damage, a mulch in the form of straw, etc. is used to cover the standing ground. In case of a really hard frost, Bubble Wrap is added as well. This protective material will have to be removed again later; otherwise the shoots would become too tall. When using a standing ground, the entire cold requirement has to be supplied by natural conditions. The best results are achieved by planting when the soil temperature is 9°C . Planting at temperatures higher than 13°C is inadvisable due to a reduced cold effect and increased risk of diseases caused by such pathogens as *Erwinia* and *Fusarium*. As the temperature in the standing ground drops further below 9°C , the effect in terms of cold requirement decreases and the cold period will have to be extended.

Just before housing from the standing ground, the mulch covering the hyacinths and remaining between the shoots in the boxes or pots is shaken off. During this process, make sure that the bulbs are not exposed for long periods to temperatures below zero, especially under windy conditions. To prevent the leaf tips from drying out, it is a good idea to cover the housed pots with plastic film for the first day or two. The last remnants of soil should be washed off the shoots during the first heavy watering.





Plant carefully for a good start

Forcing in trays or boxes

In the Netherlands, this is easily the most important forcing method. Pots planted with hyacinths are placed in trays or boxes and stored in rooting rooms. Here, the bulbs develop their roots in trays/boxes that are stacked up. They are kept here until they complete the required cold period. This system is also gaining in popularity due to its benefits for scheduling and saving on labour. The planting medium is potting soil. The pots are often stored in plastic trays, but wooden boxes are also used. They have to be deep enough to accommodate both the pots and their emerging shoots (the shoots are usually approx. 6 cm to 10 cm in height). In practical terms, this means that the trays have to be 16 to 20 cm tall (or deep). Remember that larger pot sizes are usually taller, too, so they will require a taller tray. After planting, the pots are watered with as much water as it takes to moisten the soil thoroughly without entirely saturating it. This eliminates the need to water the plants again until housing, provided that the RH in the rooting room is kept high and the floor in the rooting room is sprinkled with water occasionally.

When hyacinth bulbs root, the roots can exert so much upward pressure that the bulbs can emerge from the soil. This is why it is necessary to cover the planted bulbs with a layer of sand at least 3 cm thick. Instead of this layer of sand, growers in the Netherlands often use pieces of foam rubber at least 4 cm thick or racks that fit exactly between the trays in the stack to keep the bulbs from pushing up through the soil. When planting later in the season, this root pressure and the risks of emerging from the soil increase. Once the

bulbs have rooted to the point where the roots start to emerge from the bottom of the pot (after about 3 weeks), the material used to cover the bulbs can be removed to give the shoots more room to grow. This also keeps the roots from the trays above from growing into the foam rubber. In comparison with foam rubber, the use of racks does a better job of maintaining the right temperature in the stacks.

Be alert to the possibility of fungal diseases

Fresh potting soil is by far the most commonly used medium to fill the pots, no matter where forcing is done. Although it would also be conceivable to use good-quality soil from the grower's own nursery bed or soil from the standing ground, doing so would involve more risk of disease. Besides, this soil is often too heavy. Because the preferred pH for the potting soil is around 6 to 7, a peat substrate will always require the addition of lime. The soil must have a good permeable structure in which the soil particles are not too fine. If soil particles are too fine they can provide less oxygen which increases the risk of Pythium infecting the roots when the pots are watered.

For planting, the pot is filled to the brim with potting soil and the bulb is pressed lightly into it. The top part of the bulb is positioned just above the rim of the pot. Pressing too hard on the bulbs will give the roots less space and increase the chances of them growing upward out of the soil. Larger forcing operations often use potting machines to fill the pots; there are various kinds of machines on the market.





Each cultivar responds differently

Here is a list of the hyacinth cultivars used for producing pot hyacinths. Their minimum cold periods (expressed in weeks) are given according to the 4 periods in the forcing season. The supplier has already given these hyacinth bulbs the necessary intermediate treatment following flower initiation. (A planting temperature of 9°C is assumed)

Cold period in weeks per cultivar

CULTIVAR	TO HOUSE POTS UNTILL 17 DECEMBER	TO HOUSE POTS FROM 17 DECEMBER TO 24 JANUARY	TO HOUSE POTS FROM 24 JANUARY TO 24 FEBRUARY	TO HOUSE POTS FROM 24 FEBRUARY TO 24 MARCH
Aiolos	11	10	10	9
Amethyst	•	•	13	12
Anna Liza	10	9	•	•
Anna Marie	10	9	•	•
Antartica	10	9	•	•
Apricot Passion	11	10	10	9
Atlantic	10	9	•	•
Blue Jacket	•	•	13	12
Blue Pearl	11	10	9	9
Blue Star	11	10	10	9
Carnegie	13	12	11	10
China Pink	11	10	10	9
Delft Blue	11	10	10	9
Fondant	11	10	10	9
Gipsy Princess	•	•	12	12
Gipsy Queen	•	•	12	12
Jan Bos	•	11	10	10
L'Innocence	10	9	9	9
Marconi	•	•	13	12
Minos	10	9	9	9
Miss Saigon	•	11	10	9
Ostara	13	12	11	10
Pink Pearl	11	10	9	9
Purple Sensation	11	10	9	9
Purple Star	11	10	10	9
Sky Jacket	•	•	12	11
Splendid Cornelia	10	10	9	9
Top White	11	10	10	9
Viking	9	8	•	•
White Pearl	11	10	9	9
Woodstock	•	11	10	10

• = cultivar not suitable for this period.

Multiflora types that produce several flowering shoots are available for some varieties. The characteristics of individual cultivars that determine their use vary considerably. A number of cultivars are better for early forcing while others are more suitable for late forcing. Some cultivars are also more difficult to force.



HYACINTHUS 6



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Plant to programme the flowering period

Planting the right number of bulbs according to pot size

Pot sizes range from small square 7 cm (6.8 cm) pots for one bulb to very large pots that can accommodate dozens of bulbs. The following table provides information about some of the most commonly used, smaller pot sizes:

POT SIZE	QUANTITY PER POT	BULB SIZE (CM)	APPROX. NUMBER OF POTS IN A 50 TO 75 CM TRAY	APPROX. NUMBER OF POTS IN A 40 TO 60 CM TRAY	APPROX. NUMBER OF BULBS / NET M ² (IN TRAYS)
7 (6,8) cm square	1	16/17 17/18 18/19	75	48	190
9 cm round	1	18/19 19/-	43	25	110
10,5 cm (4 inch) round	1	18/19 19/-	33	20	80
10,5 cm (4 inch) round	3	13/14	33	20	240
12 cm round	3	15/16 16/17	24	15	180
14 cm (approx. 6 inch) round	5	15/16	17	10	200
16 cm round	5	16/17 17/18	12	7	150

Plant to programme the flowering period

The time to plant depends on the desired flowering period. For early forcing, the bulbs will have to be planted early in the season. For later forcing, planting can also be done later (see the table with cold periods expressed as weeks for each cultivar).

When using a standing ground outside, the soil temperature determines the time for planting. In rooting rooms, where the temperature can be controlled, it is possible to plant batches of bulbs prepared for very early forcing. This is not always possible when planting outside because the soil temperatures have not yet dropped enough. If planted in a standing ground under these conditions, there will be greater risk of infection from pathogens. The best soil temperature for planting is around 9°C. A period of a few weeks during which a slightly higher temperature (up to around 13°C) persists, is usually not harmful.

Planting all the bulbs before the first half of November can be done but it will lead to much longer cold periods for the late forcing period. This procedure can be followed only if the temperature in the rooting room is reduced in time.

Optimum rooting takes place at 9°C

The best rooting temperature is 9°C. Later in the season, however, a slightly lower temperature may be used. The best possible temperature to apply during the cold period is 9°C; this is the temperature upon 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 must be extended. Both an excessively high temperature as well as an excessively low temperature will have to be compensated for by adding to the sum of cold weeks. Maintaining a constant temperature of 9°C can result in overly tall shoots. If it looks as if this might occur, the temp. could be lowered but not any lower than approx. 0 to 1°C. The shoots must not touch the trays above them. The best height for the shoots at the time of housing is 3 to 6 cm.

TEMPERATURE DURING COLD PERIOD	PERIODE
9°C (can possibly be reduced to 7 or 5°C)	(August), September, October
9°C (can possibly be reduced to 7, 5, 2°C)	November, December
9°C (can possibly be reduced to 1°C even -0.5°C)	January, February, or March





Schedule flowering yourself

Creating a forcing schedule

A forcing schedule can be drawn up by using the previously listed cold periods. For example a forcing operation wants to have marketable pot hyacinths with flower clusters easily visible between the leaves on 7 December. If it takes one week to green up and pre-force the plants in the greenhouse, and if the cold period for that cultivar is 10 weeks, the bulbs will have to be planted to start their cold period 11 weeks before 7 December: around 20 September. The pots can then be housed around 1 December. The same method can be used to calculate the earliest date for planting hyacinths in pots for a later housing date.

Equipping the greenhouse

Once the hyacinths have completed their cold period, they can be brought into the greenhouse where they will be kept for a certain length of time to green up and to force the flowers into the desired degree of maturity. The pots, perhaps still in their trays or boxes, are placed on benches, on pipe structures or on the ground. After housing, it would be advisable to water the plants thoroughly to wash unwanted soil from the shoots as well as to rinse any harmless *Penicillium* fungus from the bulb tunics. Hyacinths can also be watered by overhead irrigation systems later. Because they can be forced into flower with relatively little light, most greenhouses can be used to force them. Light is necessary to green up the plants and to ensure that the shoots open to display the flower cluster. More light speeds up the opening of the leaves. Unlike tulips, hyacinths can also be forced at a higher RH (up to 85 – 90%). This is why greenhouses used for forcing hyacinths are often provided with double glazing, plastic film, etc. for extra insulation.

Greenhouse temperatures range from 20 to 25°C for early forcing to 18 to 20°C for late forcing. If warmer temperatures are applied during forcing, the hyacinths will remain shorter and flower earlier with shorter leaves. Lower temperatures will result in taller plants that flower later with the flower cluster positioned deeper among the leaves. A common practice when forcing hyacinths is to use heating from under the crop (floor or in-bed heating or pipes under the benches) as the main source of heat. This encourages the flowers to emerge above the leaves.

Preparing the crop for selling

Pot hyacinths can be sold as 'sprouted hyacinths' very soon after housing. All it takes is for them to green up. When sold at this stage of maturity, they are usually accompanied with a label displaying a photo of the cultivar and some simple care instructions. But pot hyacinths can also be sold when the flower cluster is displaying colour and easily visible among the leaves. The small 7 cm square pots are available in the colour of the hyacinth planted in them. People are looking for hyacinths with uniform shoot lengths and similar quality. Many hyacinths are transplanted into special pots as part of Christmas arrangements or decorative springtime pots. Hyacinths that are tall, top-heavy and planted in small pots can easily topple over, pot and all, after being purchased by the consumer. Adding supports keeps the plants from falling over the edge of the pot. Hyacinths that are ready to sell can be kept at 2 to 5°C in refrigerated storage. When stored at 1°C, they can be held longer, even for a number of weeks. Hyacinths with 'straw florets' (desiccated flowers) or poorly developed clusters, however, will be more susceptible to infection by *Penicillium*.





Using good hygiene prevents problems

The production of pot hyacinths usually runs smoothly. Many problems can be prevented by a careful choice of material and the proper handling of the bulbs before and during production. The following chart lists the leading pathogens and a physiological disorder and how to deal with them. In large part, working preventively reduces the risk of infections and physiological disorders.

CAUSE		SYMPTOMS	PREVENTION/CONTROL
Rhizoctonia solani (soil-borne fungus)		Leaves begin to discolour and die and florets in the cluster rot. Often seen between the leaves and on the cluster is cobweb-like fungal growth.	Use fresh potting soil and clean sand as covering material. <i>Never</i> cover the bulbs with a humus-rich soil but with fresh clean sand.
Penicillium (green fungus)		Plants with poor rooting or roots developing only on one side. This disease always begins with excessively damp conditions during storage.	Keep the bulbs from becoming physically damaged and plant them immediately upon receipt. Store bulbs under dry conditions with proper air circulation.
Pythium (soil-borne fungus)		Rotting of the roots which results in short plants that fail to produce a good flowering display.	Use fresh soil. Use new pots or pots that have been properly cleaned and disinfected with steam or hot water.
Erwinia (bacterium)		The leaves develop wet green, elongated spots that run upward from the leaf base. The plants have an unpleasant odour.	Plant at 9°C and not at higher temperatures. Do not plant under wet warm conditions.
'straw florets' / 'green tops' (Physiological disorder)		Florets at the top of the cluster can remain green or desiccate and then start to rot. This occurs mainly among heavy clusters. Very heavy clusters can also grow crookedly.	The usual cause of this disorder is a failure to carry out the steps in production properly during the earliest forcing period; for example a shortened cold period (housing too early), starting the cold period too soon, and/or a cold period in which the temperature is too high or too low.



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