

## Grape Hyacinth (*Muscari*) Cooling and Forcing

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Grape hyacinths have long been an interesting specialty potted plant. The bulbs are produced in Holland and exported to North American forcers where they are planted, cooled (or, cooled and planted) and forced for spring sales.

For many years, the armeniacum species (*Muscari armeniacum*) was the main, if only, kind of grape hyacinth available. In more recent years there has been an explosion of varieties available in Holland from the breeding work of a few dedicated groups. In the North American market the main cultivars now are ‘Big Smile’ (an armeniacum type) and a newer series, the “Magics”, comprised of ‘Blue Magic’ (traditional blue), ‘Ocean Magic’ (pale blue) and ‘White Magic’ (white).

In cooling and forcing studies over the last three years, we have noticed some significant differences between these groups, some of which could be very important for the best forcing of these cultivars. These differences, and suggestions for handling and forcing in the upcoming season are presented below.

**Cultivars.** As mentioned, ‘Big Smile’ is derived from *M. armeniacum* and generally behaves as the species. On the other hand, the “Magic” cultivars come from a different species, *M. aucheri* (previously known as *M. tubergenianum*). Their genetic background is what causes them to behave differently.

**Grape hyacinth production challenges.** Overall, grape hyacinths are easy to grow, but they do have a couple of problems that must be overcome. The main one is that the leaves can grow long and straggly and reduce the aesthetic value of the plants. This is especially true when bulbs are planted without any pre-cooling, such that all cooling happens after planting, or if bulbs are cooled too long.

**Current suggested handling practices.** Grape hyacinths, like tulips, are capable of perceiving their cold period as “dry” bulbs. Giving most of the required cold as a dry bulb greatly reduces the rooting (and growing) period of the bulbs, and this is the first and most common way to grow grape hyacinths without excessively long leaves. Simply give the bulbs (either by the supplier, or in your own facility) dry cold (that is, within the dry wood shavings the bulbs are probably shipped in) for 10-12 weeks. This should be in a cooler that does not have lots of wet pots so as to reduce fungal growth on the bulbs (*Penicillium*) and to minimize roots pushing off the base plate. Then, plant the bulbs and return to 48F (9C) for 4 weeks of rooting. The total cold duration (dry cold before planting and cold after planting) should equal the required

total number of weeks (in the case of *M. armeniacum*, the Forcer's Guide recommends 18 total weeks as the optimum cold duration and 14-15 weeks as the minimum – for cultivars Blue Spike and Early Giant). Your supplier may have different recommendations for different cultivars.

One very nice thing about grape hyacinths is that they do not root aggressively and do not lift themselves up out of the pots as their roots emerge. Thus, they are very easy to plant...simply fill the pot, then gently press the bulb into the top of the soil, burying it about half way, so that half to 1/3 of the bulb is visible.

### **Recent Cornell research reveals differences in cultivars and cold accumulation.**

Over the last few years, we have been working on 'Big Smile' and members of the "Magic" series to evaluate differences in how they perceive cold, and whether their optimal temperatures for cold accumulation differ. And, we have found there are indeed significant differences in their behavior. Essentially, we have given bulbs 6, 8, 10, 12 or 14 weeks of dry pre-cooling (in mesh bags with some dry wood shavings) at temperatures of 1, 4, 7 or 10C (about 34, 40, 45 or 50F). After pre-cooling, we planted into 4" pots, watered in, and placed them at 9C (48F) for 4 weeks of rooting and final cold treatment. Thus, total cold durations ranged from 10 to 18 weeks. Based on our results, suggestions for handling these newer cultivars are given below.

**'Big Smile'**. 'Big Smile' is a cultivar that prefers cooling at warmer temperatures, such that 9 to 10C (48-49F) dry pre-cooling leads to fastest flowering (see photos). Like most spring bulbs, the *longer* the cold period, the faster it grows and flowers. And, importantly, the longer it is cooled, the longer the leaves are at flowering. However, with 'Big Smile', the days to flower (after putting into the greenhouse) does not change a lot as the total cooling period (dry cold + cold after planting) increases from 10/12 to 18 weeks. Thus, we have seen very acceptable plants from somewhat shorter cold treatments than might historically been recommended. For example, 8 to 12 dry cold weeks followed by 4 weeks at 9C after planting (12 to 16 total weeks) produced very nice plants.

**The "Magic" cultivars.** The three cultivars, 'Blue Magic', 'White Magic' and 'Ocean Magic' have behaved similarly to each other in our trials, but they are all very different from 'Big Smile'. First, the "Magics" flower more slowly than 'Big Smile', occupying more time and space in the greenhouse (by a few days). Another important difference is that these three accumulate cold only very slowly at 7 and 10C. *Colder dry cooling temperatures, 1 to 4C, are much better for these cultivars.* This is completely at odds with most commercial recommendations, and should be carefully considered in your production scheme. Like 'Big Smile', as the duration of cold (at any temperature) increases, these cultivars flower more quickly and their leaves and stems are longer. However, the "Magics" are significantly delayed in flowering if their cooling happens at 9-10C (see photos). For the "Magics", the optimum temperature is close to 4C (40F), and cooling effectiveness is rapidly lost as temperatures increase to 10C. However, good plants can be grown with a combination of 8 to 12 weeks of dry cold at 1-4C followed by 4 weeks of rooting at 9C (12 to 16 total weeks).

**Effect of dry cooling temperature on leaf and stem length.** For all *Muscari*, the colder the dry cooling temperature, the longer the stems and leaves are at flowering. Some degree of control of leaf length can be obtained by giving less cold than is recommended in the Forcers Guide (which shows an optimum duration of 18 weeks). Our results show a good compromise between forcing time and leaf length by giving 8 to 12 weeks of dry cold (at 9C for 'Big Smile' or 4C for the "Magic" cultivars), followed by planting and an additional 4 more weeks rooting at 9C (48F). While we have not studied the effect of rooting temperature on *Muscari*, we do recommend rooting them at 9C (48F). It is known that tulips, daffodils and hyacinths root much more slowly at 4C than at 9C, and we assume *Muscari* is the same. Therefore, for now, we recommend both cultivars be rooted at 9-10C.

**Big Smile**



8141

**Blue Magic**



8255

**Ocean Magic**



8243

**White Magic**



8266

**1C dry cooling**

**4 C dry cooling**

**10C dry cooling**

14 12 10 8 6

14 12 10 8 6

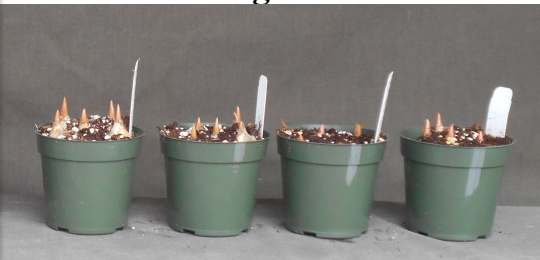
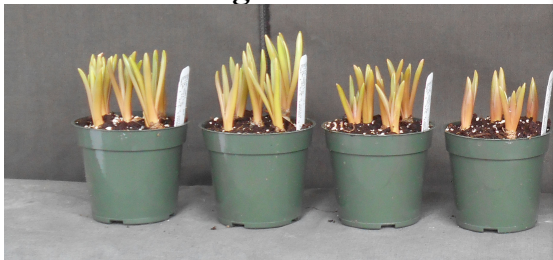
14 12 10 8 6

Weeks of dry cooling

Effect of dry cold temperature and duration on growth of 4 Muscari cultivars. Plants were given dry cold at 1C (the left-most 5 plants in each panel), 4C (the middle 5 plants) or 10C (the right-most 5 plants). Within each group of 5, bulbs had (L to R): 14, 12, 10, 8 or 6 weeks of dry cold, then planted and given 4 weeks rooting at 10C prior to forcing. All plants were forced starting at the same time. Set 1. Experiment 2014-SB1

**Big Smile**

**Blue Magic**



6 wks (8420)



8 wks (8419)



10 wks (8418)



12 wks (8417)



14 wks (8416)

**1      4      7      10C**

**1      4      7      10C dry cooling**

Effect of dry cooling temperature and duration on ‘Big Smile’ (left group) and ‘Blue Magic’ (right group) grape hyacinth. Top to bottom 5 panels: 6, 8, 10, 12, 14 weeks of dry cold before planting. Within each cultivar, L to R: dry cooling at 1, 4, 7, 10 C. All plants were planted and cooled 4 weeks at 10C before forcing (all forcing started at the same time). Experiment 2016-SB1.