



RESEARCH NEWSLETTER



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Initial Summary of 2013 Research Season: Forcing, Drysales and Landscaping

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The 2013 forcing season is now over and we thought it would be a good opportunity to highlight some of the more interesting findings from the greenhouse work, and last year's landscape results. Much of this information is already available on the website of the Flower Bulb Research Program, <http://www.flowerbulbs.cornell.edu>, and other items will be added as we move forward.

Hyacinth heaving

Heaving of hyacinths out of the pot (Figs. 1, 2) is sometimes a serious problem for North American forcers since most do not use the foam pad method common in Holland. We conducted a simple experiment to look at ways to solve or at least reduce this problem. We planted bulbs shallow, deeper, or literally on the bottom of the pot. With some, we sprayed non-toxic water-soluble glue onto the soil to glue it all together. On some, we wrapped two rubber bands such that if the bulb lifted up, the bands would push back down. With others we placed a circle of plastic mesh (with 3-4 mm grids) above or below the bulb with the idea the mesh reduce heaving by requiring the bulb to lift more soil (from on top), or toe whole weight of the bulb (if on the bottom).

It was not an easy experiment to really collect data on, but it was pretty clear the simplest way to minimize lifting was to plant the bulb deeply in the pot, but, importantly, *not on the bottom of the pot!!* Deep planting means more weight of soil on top of the bulb, and therefore it is more difficult for the bulb to lift itself up. This is also why a heavier substrate (with some sand, or mineral soil) has less heaving.



So, if deeper is better, then all the way down is best, right? No! Planting the bulb literally on the bottom of the pot directly led to serious problems with basal rot, reduced rooting and very uneven growth. The glue treatments were no better...usually the bulb just pushed up a big chunk of glued-together soil (Fig. 4). The rubber band method worked well (Fig. 5), and this could potentially be a practical way to solve this problem on a small scale.

The bottom line is deep planting, with at least 1 cm of mix below the bulb and as much on top as possible, is the simplest approach and is likely to minimize lifting. While not studied, I would bet that adequate watering would also be a good idea, as that will make the medium heavier during the phase when roots are growing down. Once they are circling, the bulb will no longer lift up.

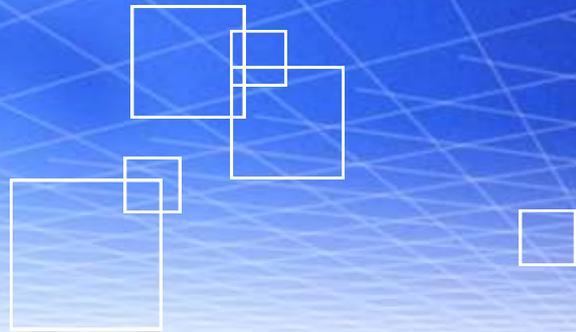
Agapanthus: A new garden perennial for cold climate zones?

In 2002, we received some plants of *Agapanthus* 'Sea Foam', a small flowered, white cultivar. We planted it into our Cornell University perennial trials in Ithaca, NY. Until the recent revision of the USDA cold hardiness zone map, Cornell has been in the cold end of zone 5 (zone 5a, with average annual extreme minimum temperature of -20 to -15F or -29 to -26C). The new map now places Cornell in the warm end of zone 5 (zone 5b, with average annual extreme minimum temperature of -15 to -10F, or -26 to -23C). Still pretty cold if you ask me! The 'Sea Foam' planting has flourished for 10 years, and has proven itself to be fully winter hardy (Fig. 6). This is most unusual, as we generally think *Agapanthus* to not be hardy much colder than zone 6 or 7, depending on the species and series. While there are some references to the small flowered hybrids being hardy to zone 5, most gardeners do not routinely try this out. Given our experience with 'Sea Foam', there just might be more potential for this genus in colder temperatures than we normally think.

To test this, we planted bare roots of 'Blue Triumphator', 'Donau', 'Dr. Brouwer', 'Elisabeth', 'Ice Lolly', 'Pinnocchio', 'Polar Ice' and 'Sunfield' in mid-summer of 2011. The bare roots were under quite a lot of stress, and many did not survive initial establishment. Counts were made in the fall of 2011, prior to onset of winter. After the winter of 2011-2012, when counts were made in summer 2012, *every single plant survived*, and most flowered. We are of course eagerly waiting for summer 2013 for further evaluations, but it is quite likely this experiment will provide additional evidence that small flowered *Agapanthus* could be considered as potential perennials for at least the warm end of Zone 5. Whether this is due to climate change, or simply a lack of trying, the plant and flower forms of *Agapanthus* would be a welcome addition to many warm zone 5 gardens.

Tips for dry sale Amaryllis

In the 2013 forcing year, we tried a number of treatments to improve uniformity and quality of forced amaryllis, including growth regulator treatments to reduce stem (scape) growth and long term pre-plant soaking pretreatments (the premise being this might "soften the base plate and allow easier rooting"). Experiments were done at Cornell and at Kansas State University (with Dr. Chad Miller). While the detailed data are still being analyzed, it is clear that soaking amaryllis bulbs at room temperature (68-70F or 18-20C) for 12-24 hours before planting was an excellent treatment. Compared to non-soaked control bulbs, the ones soaked for 12-24 hours before planting has more rapid and uniform early leaf growth, and greater overall early vigor (Figs. 7 and 8). The experiments indicated that short soak times (1 hour) were of no benefit, they do need to be longer soaks. This was true for all three cultivars tested, which included 'Samba', 'Olaf' and 'Matterhorn'.



From this experiment, drysale customers should be advised that soaking amaryllis bulbs in room temperature water for 12-14 hours is beneficial and will lead to more uniform and vigorous early leaf growth.

It also seemed like soaking improved rooting, which will help prevent pots from toppling over. We'll continue with this work in the coming season.

Hyacinth and Tete-a-Tete cooling: What is too cold, and how to compensate for a lack of cooling?

After planting, North American forcers generally have several species in a cooler, principally tulip, daffodil and hyacinth. While the basic cooling requirements for these species is compatible, in recent years it has become more common to drop the temperature in the cooler more rapidly than in the past to minimize tulip root growth to reduce *Trichoderma* problems for late forcings. Tulip roots grow rapidly at 48F (9C), and to a lesser extent at 40F (4C), while 33F (1C) severely reduces tulip root growth. Since *Trichoderma* problems commonly occur in very heavily rooted plants, a rapid reduction of temperature has been suggested as an easy way to reduce excessive tulip root growth.

However, when hyacinth and Tete-a-Tete are in such coolers, they are exposed to temperatures that are substantially lower than optimum, and it has been noted that hyacinths and Tete-a-Tete often grow very slowly after being cooled in "cold" coolers. This is probably due to 1-2C (33-34F) being less suitable cooling temperatures for these crops. These low temperatures are *less efficient cooling temperatures* and the plant essentially *accumulates less cold stimulus at colder temperatures*. Basically, 4-7C is the most optimal cold temperature, and extremes above or below this are less efficient for cold accumulation by the bulb.

A related question is whether or not a grower could finish cooling his hyacinths and Tete-a-Tete crop at a warmer temperature after tulips are removed from the cooler for forcing to help "make up" the cooling.

Some recently completed experiments shed light on this topic. We planted then cooled 'Aiolos', 'Pink Pearl', 'Blue Jacket' and 'Tete-a-Tete' for 4 weeks at 9C, then gave them 8 weeks of 1C to simulate a "cold cooler" being managed to control tulip root growth. Then, plants received 0, 1, 2, 4 or 6 weeks at 10C, to simulate different durations of a warmer "after temperature" after tulips were removed from the cooler. As you can see in Figs. 9-12, growth was severely reduced when plants had 12 weeks of cold, when 8 of them were at 1C. If plants were given additional durations of the much warmer 10C, rapid and normal flowering was the result.

This experiment supports the concept of raising temperatures on hyacinth and Tete-a-Tete, if needed after tulips come out of the cooler, to compensate for very cold temperatures to control tulip root growth.

Ethephon (Collate, Florel, Ethrel) drenches for height control in daffodils and hyacinths

During the last two forcing seasons, we have seen really great potential for using ethephon (Florel, Ethrel, Collate are examples of ethephon products on the market) as a substrate drench for height control of hyacinths and narcissus. An example is in Fig. 13, showing effects of 0, 100, 250 and 500 ppm ethephon drenches on Primeur narcissus. In 2013, we did a number of studies on timing, temperature effects and drench or spray volume and concentration. We'll report on these in a future newsletter, but the potential is really excellent. As a direct result of this work, the company that markets Collate (Fine Americas) is in the process of working on a label for drench applications of Collate on hyacinths and narcissus. We'll keep you posted on the progress.

“Bud sticks” for pot and cut hybrid lily timing

Anyone not attending Dutch Lily Days is certainly missing out! I was pleased to give a lecture at DLD on May 23 (at Zabo Plant) that scratched the surface of our recent and past lily work. An item of particular interest is our new information on “Bud Sticks” for timing many hybrid lilies. While we have not literally developed bud sticks for each cultivar, we have collected the data together so that a forcer can look up, by cultivar, the options for timing bud opening at different temperatures, this is obviously useful for timing crops for holiday and other market dates. More on this to come, but the information is now available on the web page at www.flowerbulbs.cornell.edu under the “Timing Tools for Hybrid Lilies” link from the home page.



Fig. 1. Commercial hyacinth with heaving problems. Image 5000.



Fig. 2. ‘Pink Pearl’ heaving as a result of shallow planting in a 10 cm pot. Image 2910.



Fig. 3. Pink Pearl planted on the bottom of a 4” pot, note rot and poor rooting. Image 2937



Fig. 4. 'Pink Pearl' heaving, shallow planted bulb, soil surface sprayed with glue. Note soil glued to the top of the bulb. The glue did not help. Image 2919.



Fig. 5. Example of two rubber bands being used to stop hyacinth heaving. Image 2925.



Fig. 6. *Agapanthus* 'Sea Foam', which has survived 10 winters in Ithaca NY (Zone 5). Image 0093.



Fig. 7. *Amaryllis* Samba, not soaked. Photo taken at the same time as the one below. Image 2647



Fig. 8. Amaryllis Samba, soaked for 12 hours in room temperature water before planting soaked. Photo taken at the same time as the one above. Image 2649.



Fig. 9. Aiolos. All plants had 4 weeks of 9C then 8 weeks of 1C to simulate a cold cooler. Then, plants had (left to right): 0, 1, 2, 4 or 6 weeks of ending 10C. Image 7895.



Fig. 10. Blue Jacket. All plants had 4 weeks of 9C then 8 weeks of 1C to simulate a cold cooler. Then, plants had (left to right): 0, 1, 2, 4 or 6 weeks of ending 10C. Image 7896.



Fig. 11. Pink Pearl. All plants had 4 weeks of 9C then 8 weeks of 1C to simulate a cold cooler. Then, plants had (left to right): 0, 1, 2, 4 or 6 weeks of ending 10C. Image 7894.



Fig. 12. Tete-a-Tete. All plants had 4 weeks of 9C then 8 weeks of 1C to simulate a cold cooler. Then, plants had (left to right): 0, 1, 2, 4 or 6 weeks of ending 10C. Image 7897.



Fig. 13. Primeur plants drenched in the greenhouse with L to R: 0, 100, 250, 500 ppm ethephon (using Florel). Image 7240.