

RESEARCH NEWSLETTER



This Flower Bulb Research Program Newsletter is published by the Royal Dutch Wholesalers Association for Flowerbulbs and Nurserystock in cooperation with Dr. Bill Miller of Cornell University.

Research "Quickies"

Upper Leaf Necrosis

Alex Chang has recently finished his Ph.D. project, which was looking at "Upper Leaf Necrosis" in oriental hybrid lilies. This problem, referred to as "scorch" in many countries, is a special problem with certain oriental hybrid lily cultivars (see Figures 6-8).

A full report is forthcoming in a future research newsletter, but some of the main points are as follows:

- Cultivars vary in their sensitivity. 'Star Gazer' and 'Acapulco' are very sensitive, for example.
- Larger bulbs (16/18 cm) show the problem more than smaller bulbs (14/16 cm)
- The problem is a calcium deficiency that arises because of two factors. They are:
 - At the time of lifting, bulb scales (and the small shoot inside) have very little calcium in them.
 - Young leaves cannot get enough calcium from the plant at the critical stage, which is when the plants are about 10-12" tall.
 - The actual calcium deficiency problem occurs when the plant is quite small (10-12" tall), but no ticeable symptoms only show up much later.
 - Fertilizing the soil with extra calcium had almost no effect on the problem since it is the lack of *up take, absorbtion and movement* of calcium that causes ULN, not its availability in the soil.

Increasing air movement, by blowing fans directly on plants so that the upper leaves move slightly, is a very good way to reduce the problem. This should be done between about 20-50 days after planting. This works by causing more water to be lost from the leaves, and therefore more calcium movement to the upper, young leaves.

Trichoderma

We have recently written an article on Trichoderma in tulips, with information on symptoms, causes, and control measures. There are a number of photos in this publication, and it should be useful for anyone forcing tulips. This article is available on the Cornell Flowerbulb Website at

http://www.hort.cornell.edu/department/faculty/wmiller/bulb/_Trichoderma_May_2004.pdf



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Perennialization of Hyacinth Cultivars in Ithaca, Long Island, and Clemson, SC

One of the long-term objectives of the Cornell University Flowerbulb Research Program is to evaluate and recommend bulb cultivars with excellent performance in various areas of North America. Because of the many cultivars available, this is a major task! In addition, the diverse climate zones in the US presents a challenge for doing such research and trialing. Our climate zones range from warm, humid areas of the southeastern United States, to the cool and wet Pacific northwest, to the cold winters and warm, humid summers in many northern states. In all of these areas, a wide range of temperature, rainfall, snow cover, summer heat and humidity, sunlight, fog, soil condition, and horticultural management will be encountered, and will affect how well a bulb perennializes in the landscape. It is expected that the information presented here will be useful to exporters and importers of flowerbulbs, and their landscaper, retailer, and homeowner customers.

A more complete report of this trial is available on the 2003 CD published by the Flowerbulb Research Program. A copy of this CD is available on request from Bill Miller.

Procedure

Overall, the trials consisted of 60 cultivars of narcissus, 17 cultivars of hyacinth, 69 cultivars of tulip, 11 species tulips, and 43 kinds of special bulbs. Different numbers of bulbs were used, depending on the species, and ranged from 3 (e.g. *Fritillaria*) to 75 (e.g. *Scilla*) bulbs per plot. For hyacinths, 20 bulbs were planted per plot. The experiment was located in Ithaca, NY (central New York, zone 5, cool summers), on Long Island (ocean climate, zone 6-7, moderate summers), and in Clemson, SC (zone 7, hot, humid summers). Plots were planted in full sun

or shade in the late fall of 1999. After planting, plots were maintained relatively free of weeds (Roundup the first summer after all foliage had died back), and some hand weeding and hoeing thereafter. Plots were fertilized with recommended rates of Bulb Booster fertilizer in the first year, with no fertilization thereafter. (note: this is against recommendations for bulb perennializing, but the consensus of the research committee was to give the harshest test, and also the view that most homeowners do not fertilize bulbs other than at planting). The plots were not irrigated, and relied on natural rainfall only. Half of the plots were in full sun; the other half under ca. 50% shade cloth to simulate overhead trees. Typically, the shade was put over the plants in mid-May, and removed in mid-October (in the northern sites, and about a month earlier and later, respectively, in Clemson).

We collected yearly data on the dates of emergence, start and end of flowering, and time of leaf wilting. Data were also taken on number of flowers or stems, the number of clumps (basically, this measures how many "bulbs" are still alive), and height.

Results

Note that for all the dates given here, they could be accelerated or delayed by as much as a week at each location, depending on yearly weather.

Date of emergence

Most plants were emerged by early to mid-February in Clemson, from late February to early April on Long Island and by late March in Ithaca. There was little, if any, notable effect of shading on emergence date.

Date flowering starts

Hyacinths flower earlier in warmer climates, as would be expected.

In Clemson, flowering dates ranged from early March (Splendid Cornelia, Fondant, Atlantic) to mid-March (Anna Liza, Carnegie, City of Haarlem), with the other cultivars in-between.

On Long Island, the earliest flowering cultivars were Ostara, Multiflora ‘Borah’ and Atlantic, all in early to mid March. Other cultivars flowered as late as the 20th of April or later. In Ithaca, the coldest climate, flowering ranged from 16 to 26 April. There was no consistent effect of the shade in the date cultivars began flowering.

Date flowering ends

Depending on the cultivar, flowering ended from 27 March to 5 April in Clemson, 7 May to 13 May on Long Island and 1 May to 9 May in Ithaca, again with no consistent effect of shade.

Table 1. Plant height (cm) after three years for 17 hyacinth cultivars grown in three locations in the USA. “Sun” plants were grown in full sun, “shade” plants were grown under 50% shade cloth from late spring until early fall.

Cultivar	Sun			Shade		
	I	L	C	I	L	C
Anna Liza	14	20	22	17	23	28
Anna Marie	16	20	23	17	19	24
Atlantic	16	25	26	18	22	27
Blue Jacket	20	23	30	17	23	19
Carnegie	19	21	21	19	22	18
City of Haarlem	19	23	26	20	23	21
Delft Blue	15	23	24	16	25	24
Fondant	17	25	23	19	26	24
Gipsy Queen	18	20	26	16	20	25
Jan Bos	18	20	19	21	19	19
Lady Derby	14	24	26	14	23	23
Ostara	16	21	25	12	10	25
Pink Pearl	15	18	19	19	21	20
Splendid Cornelia	13	22	21	15	19	19
White Pearl	18	21	22	16	19	20
Borah (multiflora)	10	18	16	16	23	19
Snowwhite (multiflora)	9	16	18	12	15	n/a

I=Ithaca, L= Long Island, C=Clemson

Height

In the north, plant height ranged from the tallest, (Fondant, Gipsy Queen and Blue Jacket) to the shortest (Jan Bos, Pink Pearl and Anna Marie. Plants were somewhat taller as one moved south (Table 1). Compared to Ithaca, plants at Clemson tended to be 4-5” (8-10 cm) taller, and Long Island plants were intermediate. Within a location, there was no consistent effect of shade, which makes sense as the shade was applied after most of the plants had flowered (and leaves had grown).

Number of flowers

This was the major criterion for evaluation. Table 2 lists alphabetically the 17 cultivars in the study, and the number of flowers for each cultivar for both sun and shade plots for each location in the third year of the study. It is easy to see that the number of flowers varied by cultivar. For example, in Ithaca, Atlantic, City of Haarlem, Gipsy Queen and Anna Liza had 25 to 35 flowers from 20 bulbs, an impressive show. Anna Liza was not as good in Clemson, however, where it only had 5 flowers. The multiflora Snowwhite was very good in Ithaca and Long Island, but poor in Clemson. Some images of other cultivars are found in the figures 1-5.

With hyacinth, there was an effect of shade on the number of flowers, but it was not always consistent by location. Overall, shade tended to reduce the number of flowers, but this was more the case in Ithaca and Long Island than in Clemson. If one looks at the overall number of flowers produced by all cultivars, one can find that shade reduced the total number of flowers by 50% in Ithaca, by about 30% in Long Island, and by about 10% in Clemson. This means that shade can be a useful horticultural tool for perennializing hyacinths in warmer climates such as South Carolina. In more northern locations, the effects of shade (less light leading to less photosynthesis, or perhaps cooler soil temperatures in the summer) tend to be detrimental (fewer flowers), rather than positive as in the south. Even so, hyacinths grown in shaded plots in the north still performed well over the three year period of the experiment and shade *per se* should not be looked on as a negative for northern plantings.

Table 2. Number of flowers (from 20 bulbs) after three years for 17 hyacinth cultivars grown in three locations in the USA. “Sun” plants were grown in full sun, “shade” plants were grown under 50% shade cloth from late spring until early fall.

Cultivar	Sun			Shade		
	I	L	C	I	L	C
Anna Liza	25	20	5	10	17	5
Anna Marie	18	6	12	10	9	8
Atlantic	35	30	25	8	11	12
Blue Jacket	23	20	15	17	9	17
Carnegie	22	25	19	18	16	18
City of Haarlem	32	19	21	11	25	11
Delft Blue	21	28	16	17	17	16
Fondant	28	36	19	20	29	17
Gipsy Queen	26	17	27	9	25	22
Jan Bos	19	11	12	5	5	15
Lady Derby	16	18	29	9	19	27
Ostara	12	16	29	2	7	22
Pink Pearl	15	13	4	12	9	13
Splendid Cornelia	16	18	8	5	9	9
White Pearl	23	24	13	18	12	8
Borah (multiflora)	18	54	20	11	44	25
Snowwhite (multiflora)	30	35	3	8	10	0

I=Ithaca, L= Long Island, C=Clemson

Conclusions

Overall, hyacinths performed well in all three location, and some were truly outstanding in each climate. In all, 16 of the 17 cultivars met the minimum criteria in the full sun plots, and 15 of the 17 cultivars met minimum criteria in the shade plots. Some of the cultivars were truly outstanding in all three sites, and some were good in two sites, and less exceptional in the third.

This information in this report has been further summarized in cooperation with the IBC to develop lists of recommended bulbs for cold (e.g. Ithaca, Zone 5), moderate (e.g. Long Island, zone 6) and warm (e.g. Clemson, zone 7) climates. This publication, “Flower Bulbs for Perennializing in cold, moderate and warm climates in the USA” is available from the IBC. The criteria for the IBC list is to consider any cultivar that has at least 20% of the bulbs flowering after 3 years *in all three locations* to be a good

“perennial bulb”. With these criteria, all cultivars with the exception of multiflora ‘Snowwhite’ meet the minimum performance standards in the sun, and multiflora ‘Snowwhite’ and ‘Ostara’ in the shade.

It was somewhat surprising how well a wide range of hyacinths did in the three zones, and this gives a good choice of good-performing hyacinths in a range of colors. Hyacinths are also resistant to deer browsing, and this is a key benefit that should be recognized and advertised. The exceptional cultivars identified here should be promoted by the industry and incorporated into more gardens and commercial landscapes where they will provide several years of bright spring color and enjoyment.

More information on other species and cultivars in the perennializing trial will be presented in a future Research Newsletter.

Acknowledgments

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Figure 6. Typical symptoms of Upper Leaf Necrosis (ULN) on 'Star Gazer' oriental hybrid lilies.

Figure 7. ULN Symptoms somewhat later than in Figure 6.



Figure 8. Upper Leaf Necrosis (ULN) symptoms on a commercial cut flower crop.



Figure 1. 'Atlantic' hyacinth plot on Long Island. 4th year flowering display from 20 bulbs.



Figure 2. 'Delft Blue' hyacinth plot on Long Island. 4th year flowering display from 20 bulbs.



Figure 3. 'Fondant' hyacinth plot on Long Island. 4th year flowering display from 20 bulbs.



Figure 4. 'Fondant' hyacinth plot at Cornell University. 4th year flowering display from 20 bulbs.



Figure 5. Multiflora 'Borah' hyacinth plot on Long Island. 4th year flowering display from 20 bulbs.