

# RESEARCH NEWSLETTER



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



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## Research Newsletter No. 39 Bill Miller, Cornell University

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### Questions? Contact Bill Miller at Cornell

The Flower Bulb Research Program at Cornell exists to 1) generate new research-based information useful to the export sector in the Netherlands and their forcing and landscape customers in North America, 2) to communicate this information to these same parties and 3) to be a point of contact for technical information regarding bulbs and perennials in North America. As such, forcers, wholesalers, landscapers and retailers are encouraged to contact me with any questions they may have regarding (especially) Dutch bulb products. Usually I have a good answer. If not, I'll find an answer and get back to you. The best way of contact is email: wbm8@cornell.edu My cell phone is 607-227-2780.

### Calla Performance Under High Greenhouse Temperatures

Callas continue to be highly popular with growers and consumers alike. They grow well in a broad range of growing regions and you can't beat the vividness and clarity of their colorful inflorescences.

Like all plants, callas do have their environmental limits. Discussions with exporters have suggested a need to more carefully define high temperature maxima for callas. Commercial plantings in Florida, for example, have been observed to grow well in cooler areas of the greenhouse, while plants suffer in a hotter area of the same house. The grower in Florida noticed that growth problems seemed markedly higher in greenhouse locations that were hotter than other areas. In other words, the same bulb stock showed large variation in performance when placed in different locations in the same greenhouse.



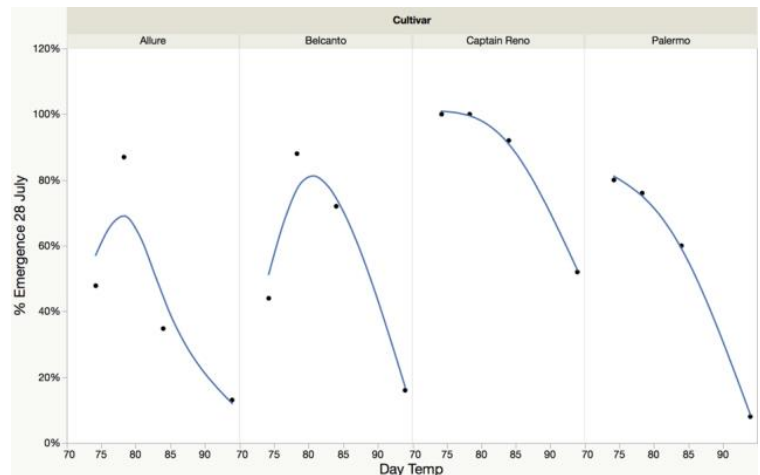
Calla bulbs were shipped by air freight from The Netherlands and arrived in Ithaca in early July. There were 4 cultivars: Captain Reno, Belcanto, Allure and Captain Palermo. Bulbs (tubers) were planted as usual on 12-13 July (1 per 6" standard pot, using Lambert LM-111 mix) and placed in 4 greenhouses (with temperature setpoints of 23, 25, 28 and 34C days and 20C nights). There were 24 bulbs per temperature treatment per cultivar.

Bulbs were planted with about 2.5" (5 cm) of soil below the bulb and about 1.5-2" (3-4 cm) on top. Bulbs were watered in well and fed upon emergence with 150 ppm N from 21-5-20 at each watering. Emergence data were collected on 28 July (16 days after planting). Additional data and photographs were taken at full flower.

**Results:**

- Temperatures of the 4 treatments averaged 72.4, 78.3, 84.0 and 94.0 (23.5, 25.7, 28.9 and 34.4C) during the day and 68.5F (20.3C) at night. Since the night temperatures are all identical, only day temperatures will be used in this article. For the sake of clarity, we'll refer to the 4 temperatures as 23, 26, 29 and 34C.
- The cultivars showed different responses to temperature. Allure and Belcanto were slow to emerge at the lowest day temperature (23C), whereas Captain Reno and Captain Palermo showed maximum emergence rate at this temperature.
- All 4 cultivars showed a dramatic reduction in emergence as temperatures increased above 26C days. Allure, Belcanto and Captain Palermo each had <20% emergence after 16 days at 34C days. As of 10 August, plants have not been specifically examined for Erwinia, but in the coming days, we will look into this.
- It can be concluded that 26C days with 20 nights, giving a 24-hour average of about 23C, is optimum for calla emergence and early growth. Day temperatures above 25-26C inhibit germination and may contribute to Erwinia development.

- Plants were examined at the conclusion of the experiment (Sept 15). Only 2 plants in the entire experiment had signs of Erwinia and was not related to any treatments. Growing temperature had no effect on Erwinia within the experiment.
- Very interestingly there was no visual difference in root growth and appearance across the treatments. While the hottest treatment (34C) severely reduced plant growth, root growth was hardly affected, if at all.
- At full flower, the best looking plants were from the coolest temperature---- (23C days). These plants had the most flowers and deepest colors. The worst plants, as expected were from the highest temperature treatment (34C days).
- For an unknown reason, plants in the 26C treatment were significantly taller than those in the next cooler (23C) or warmer (29C) treatments. It is possible malfunctions in the shade cloth system, giving additional shade to the 26C plants, is responsible.
- Based on visual observation, as day temperature increased, flower size decreased (although, no measurements were taken). This appears to be a very significant effect, along with coloration. Calla flower size and coloration are both maximized by growing plants as temperatures as low as 23C with night temperatures of 20C.



Percentage emergence, 16 days after planting versus day

Cultivar	Day Temp (F)	Night Temp (F)	24-h ave temp (F)	Day Temp (C)	Night Temp (C)	24-h ave temp (C)	% Emergence 16 DAP
Allure	74.2	67.9	71.1	23.5	19.9	21.7	47.8%
Allure	78.3	68.9	73.6	25.7	20.5	23.1	87.0%
Allure	84.0	68.2	76.1	28.9	20.1	24.5	34.8%
Allure	94.0	69.1	81.5	34.4	20.6	27.5	13.0%
<u>Belcanto</u>	74.2	67.9	71.1	23.5	19.9	21.7	44.0%
<u>Belcanto</u>	78.3	68.9	73.6	25.7	20.5	23.1	88.0%
<u>Belcanto</u>	84.0	68.2	76.1	28.9	20.1	24.5	72.0%
<u>Belcanto</u>	94.0	69.1	81.5	34.4	20.6	27.5	16.0%
Captain Reno	74.2	67.9	71.1	23.5	19.9	21.7	100.0%
Captain Reno	78.3	68.9	73.6	25.7	20.5	23.1	100.0%
Captain Reno	84.0	68.2	76.1	28.9	20.1	24.5	92.0%
Captain Reno	94.0	69.1	81.5	34.4	20.6	27.5	52.0%
Palermo	74.2	67.9	71.1	23.5	19.9	21.7	80.0%
Palermo	78.3	68.9	73.6	25.7	20.5	23.1	76.0%
Palermo	84.0	68.2	76.1	28.9	20.1	24.5	60.0%
Palermo	94.0	69.1	81.5	34.4	20.6	27.5	8.0%

Table 1. Emergence of callas with different day temperatures, 16 days after planting (DAP).



Overall view, 16 DAP. Day temperature of 74.2 (23C). Greenhouse 140a.



Overall view, 16 DAP. Day temperature of 84.0 (29C). Greenhouse 140.



Overall view, 16 DAP. Day temperature of 78.3 (26C). Greenhouse 141.



Overall view, 16 DAP. Day temperature of 94.0 (34C). Greenhouse 131.

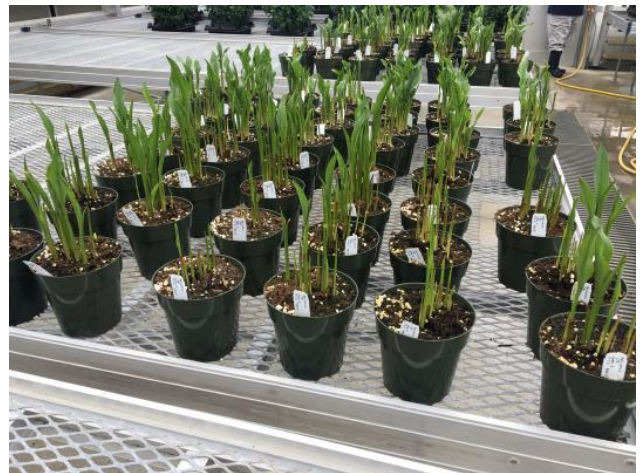
Allure



Appearance of Allure plants on August 11 (29 days after planting). All plants had night temperatures of 68-69F. Day temperatures, Left to right and top to bottom: 74.2, 78.3, 84 and 94F (23, 26, 29 and 34C).



Belcanto



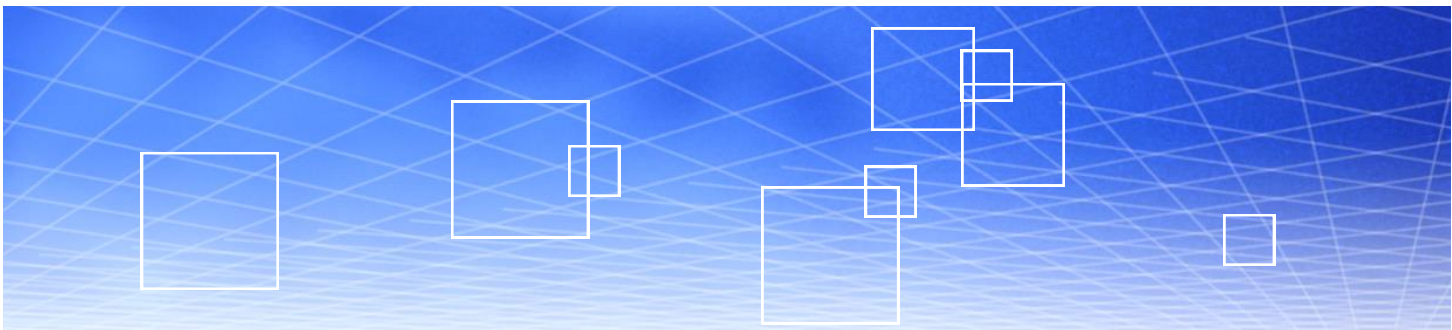


Appearance of Belcanto plants on August 11 (29 days after planting). All plants had night temperatures of 68-69F. Day temperatures, Left to right and top to bottom: 74.2, 78.3, 84 and 94F (23, 26, 29 and 34C).

### Captain Palermo



Appearance of Captain Palermo plants on August 11 (29 days after planting). All plants had night temperatures of 68-69F. Day temperatures, Left to right and top to bottom: 74.2, 78.3, 84 and 94F (23, 26, 29 and 34C).



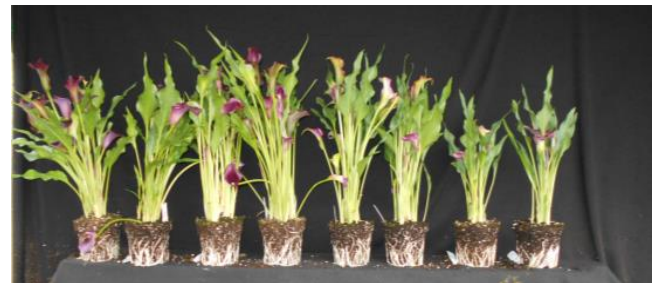
Captain Reno



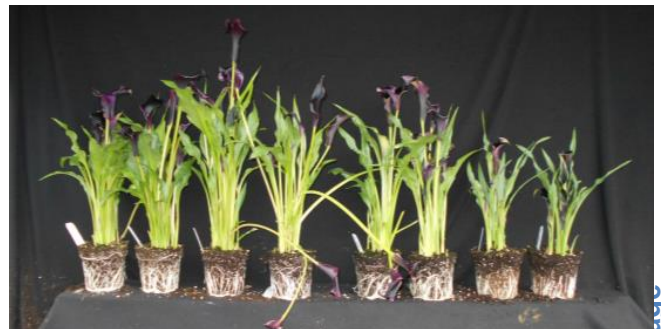
Appearance of Captain Reno plants on August 11 (29 days after planting). All plants had night temperatures of 68-69F. Day temperatures, Left to right and top to bottom: 74.2, 78.3, 84 and 94F (23, 26, 29 and 34C).



Allure



Belcanto



Captain Palermo



Captain Reno

Effect of growing temperature on final appearance of callas.  
 Left to right: day temps of 23, 26, 29 and 34C (72.4, 78.3, 84.0 and 94.0 F) with 20C (68.5F).

### Cornell in-grass bulb planter is put through its paces

We have made a number of demonstration plantings with the new “in-grass” bulb planting machine and are very impressed with its performance. We hope these plantings will serve to increase the awareness of this type of machine, and how easily large swaths and numbers of bulbs can be planted into “naturalistic” and more formal settings. In one instance, we used the planter to install a mix of alliums and Nectaroscordum to line a path through a wild meadow. The result should be an early summer color burst and excellent habitat for pollinators and other insects. Other mixtures of crocus, Muscari, Narcissus, Camassia and chionodoxa have been installed in semi-formal settings at the Cornell Botanic Garden and still other deer-resistant mixtures have been installed along major entrances to the University. Three plantings were made on Long Island, one of them, near Hofstra University, will be visible to 120,000 vehicles each day along the Hempstead Bethpage Turnpike. These highly visible plantings should increase interest and awareness of flower bulbs.

We will be monitoring the plantings over several years to develop information on the persistence of such in-grass plantings. We have also installed direct comparison trials (in-grass, using the planter, in comparison with the same species planted in traditional garden beds at our testing site in Ithaca. Finally, we have used the planter to install trials that will evaluate summer mowing dates, to develop better information about how early in the season in-grass plantings can be mowed, if required.



The planter, manufactured by A. Geerlings, attached to our small landscape tractor. The large turf tires are especially easy on grass, and have allowed planting even in rain.



Something most growers and exporters are not used to seeing: intentional, diverse mixtures of bulb species

More than 10,000 bulbs planted in 45 minutes at the Botanical Gardens! Essentially no damage to the turf.



The planter in action at the Cornell Botanic Garden, installing a diverse mix of bulbs against a mixed woody plant and perennial border.