



Warm Climate Production Guidelines for *Zantedeschia* (Calla Lily) hybrids

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Having just returned from pack trials in California, I am hoping to get articles on new plant materials out for the next couple of months. I thought the trials overall were fairly conservative this year with breeding companies mostly focusing on refining the major crops. There was a lot less 'new' crop releases this year, and considering the economy, it makes sense to play to your strengths until things begin to settle out. However, while I was visiting the west coast I got to take my first tour of Golden State Bulb Growers and see the advances in Calla lily breeding and production research that Tom Lukens and his staff have been working on. I have always loved this plant for its simple elegant flowers, but living in the Deep South I obviously have not seen it produced under optimal conditions. The tour of Golden State Bulb Growers was really phenomenal, not only to see extremely high quality Calla lilies, but also to realize that I (and possibly some of the industry) may have been operating under some misconceptions about these long lasting flowering potted crops and also missing the boat on landscape and cut flower uses as well.

Golden State had a comprehensive trial in place as their display showing over 40 different cultivars of tuberous Calla and various plant growth regulator applications, planting dates, and production methods. It was very impressive. While availability of newer colors is still limited, there were a lot

of colors there that I hadn't seen before. The focus of their trials was production related issues, solving problems for forcers of this crop, and the handouts were detailed and really helpful. I recommend that you contact Golden State if you want to learn more about this crop as it isn't possible for me to relay all of their information in this column.

First let's look at some basics of the groups of Calla lilies on the market. The colored flower types (*Zantedeschia hybrida*) are complex hybrids of different South African species and grow from deciduous tubers. These plants come from higher mountain regions where temperatures are cool but the ground never freezes. The native light levels are high and the soil drains quickly. The second type commonly found on the market is the larger white Calla (*Zantedeschia aethiopica*) which grows from rhizomes (horns) and is from more tropical valley conditions of the Western Cape in South Africa, so this species prefers a very moist to semi-aquatic location once established. *Z. aethiopica* is marketed as a bog plant or for use in water gardens as well as garden plantings.

First misconception: That the Calla hybrids with flowers in pink, lavender, yellow and bicolor forms used in flowering potted production and the much larger (*Zantedeschia aethiopica*) should be grown under the same conditions, and can be treated in the same manner. These two crops have different seasons of flower and very different watering requirements. We'll talk about that more in a minute, but with regards to watering: *Zantedeschia aethiopica* can tolerate semi-aquatic conditions once established, while the colored forms are susceptible to soil borne bacteria if the media is kept too wet. Also, once growing actively, *Zantedeschia aethiopica* will continue to throw flowers as long as conditions

are optimal, while the colored hybrids must undergo dormancy between flowerings.

Second misconception: As tropical flowers these plants prefer high temperatures and high humidity. The truth is these plants, in general, prefer cooler temperatures than tropical foliage plants. Warm temperatures and low light cause stems to elongate beyond their ability to support themselves, and the flowers do not last as long under warmer temperature regimes. These plants need bright light and cool night temperatures to avoid stretching and to get the highest quality flowering plants.

Third Misconception: That a bigger tuber is better than a smaller tuber with multiple eyes. Calla hybrids form flowers in relation to the number of eyes present in the tuber (or clump of tubers) planted. A large tuber with one eye will produce fewer flowers than a smaller multi-eyed tuber. Also it is easier to control a smaller tuber in production than it is to produce high-quality plants from a very large tuber.

On tubers:

In the colored flower forms, tubers are marketed from seed, and clonally propagated material. There is some speculation on what is best for potted flowering plant production. Speculation aside: In general you want as many eyes as possible on each potted tuber to give you the most leaves and flowers per pot.

Pretreatments:

Tubers need to be pretreated with gibberellic acid (roughly 125 ppm) to overcome dormancy requirements. However, gibberellic acid alone may induce deformed flowers in some cases so growers can pre-treat with promalin (a

combination of Gibberellic acid and benzyl adenine) which will act the same way but also increase branching with reduced flower deformities. Pretreatment of tubers is essential to uniform sprouting and flowering of the crop and can either be done in-house or you can order pretreated tubers. Fungicides can also be applied prior to planting and will help avoid disease issues from mechanical damage during shipping and handling.

One of the concepts that Golden State is promoting for growers of finished Calla is their High Input Potted Product (HIPP) program. This method of production avoids the field aspects of tuber production entirely and generates tubers for flower forcers from greenhouse grown material. The result according to Tom is that the tubers are much cleaner and the risk of disease is lower but the big advantage is that the overall vigor of the tubers is much higher, which allows forcers to use smaller tuber sizes (and also smaller pot sizes) and get the same effect as larger field produced tubers. One of the things I was most impressed with was the 4" material that was coming out this program. Growing a 4" hybrid calla that has a lot of flowers can be problematic because to get a lot of flowers you usually need a tuber that basically fills a 4" pot. The HIPP program seems to get around that issue and there were up to 7 flowers on the 4" HIPP material on trial at Golden State. HIPP tubers will have a higher price point but the concept may work for your production.

I think if I was to select out something from this collection of beautiful cultivars that I felt was really unique and or appealing it would be the gold and rose toned cultivars that Tom had on Display. I'm not as big a fan of the smaller Calla hybrids, and the yellow and Flame types were robust, with spotted foliage and a larger stature with really striking spathe colors. By the way, a Calla bloom is separated into two parts:

the spathe, which is the colorful modified leaf, and the spadix, which is the central column containing the male and female flowers. So the colorful part of the bloom is the spathe and the spadix is usually yellow, but may be white or red toned as well. I was really impressed with Millennium Gold, Flame, and Hot Flashes, but it would be splitting hairs because all the hybrids were beautiful.

Many growers can use this crop to expand their niche and should definitely look at avoiding the gallon perennial trade with this crop. It will take a bit more work and growing skill to really do a great job with Calla, so don't take all your effort and feed it into the lowest price point size. Instead, experiment with a quality 4" crop, and larger pot sizes (10-12" or color bowls) which can command a specialty price structure.

Production guidelines for colorful Calla hybrids

Tubers are shipped in fall through spring, and should be planted 1-1½ inches deep. Growers interested in using 4½ or smaller size pots need to be more careful of fertility and watering as the plants in small pots are usually weaker due to restriction of the root system.

Fertilization – Avoid ammonium based fertilizers and long term slow release fertilizers as they may cause a reduction in quality or yellowing of the leaf margins. 30 day release formulas can be used but keep rates below 1.5 grams per 6" pot. In general with liquid fertilization, 200 ppm constant feed will work fine. A good calcium source and micronutrient blend is best for quality production, so use a fertilizer which contains calcium or incorporate gypsum or lime into media before planting.

Watering – After planting, either when watering in or shortly after, apply a fungicidal drench as a preventative measure. After shoots have emerged keep plants moist but avoid soggy soil situations especially under warmer production conditions.

Media – pH of 6.0-6.5, coarse and well drained is best for optimal growth.

Production Temperatures – To get plants up and growing warmer conditions are best with a day temperature of 65-75F. As the crop matures and leaves begin unrolling cooler temperatures (65F day and 55F night) are best to enhance flower color and keep plants more compact.

Light level – Bright light is required for best quality and flowering (4000 ft. candles minimum)

Propagation – Commercially plants are produced by traditional breeding and seed production, but also via tissue culture.

Crop timing – In general it takes about 8 weeks from planting to flower on most of these hybrids. Earlier crops will be somewhat slower than crops produced later in spring when soil & greenhouse temperature is higher. First color can be up to 10 days earlier in later plantings. Warmer production temperatures can speed the crop but be careful of stem elongation and reduced flower color under warmer conditions.

Growth regulators – Paclobutrazol is a critical tool in keeping this crop from stretching and is applied as a drench when emerging foliage spikes are 2-3" tall. Repeated applications may be needed, depending on growing conditions and cultivar. For smaller cultivars a range from 6-10 ppm should help control height but for more vigorous hybrids the rates may need to go up to 10-10 ppm. Again if you

are unsure apply lower concentrations and repeat them as needed. Over application of Bonzi can reduce both flower number and plant size.

Flowering – As long as you are working with good quality tubers and have pretreated with gibberellic acid, flowering will follow emergence of the new shoots. Too high a temperature during emergence and low light levels will reduce flowering.

Note that cultivar plays a huge role in the crop; some varieties are smaller and more compact, while others can be quite large and vigorous. Speak to your supplier before ordering to make sure you are getting the cultivars best suited to your programs.

Production guidelines for White Calla (*Zantedeschia aethiopica*)

Rhizomes are available in early fall. But season will vary depending on supplier and location. Rhizomes are sold as spring bulbs in retail outlets. These flowers are vigorous growers and usually unsuited to small container sizes.

Fertilization – Most potting mixes contain a starter charge of nitrogen and other elements, this is usually enough to get rhizomes growing. Immediately after watering a preventative fungicide application should be applied. Once the rhizome sprouts begin regular fertilization with a balanced fertilizer at 100 ppm constant feed or 200 ppm if feeding weekly

Watering – Keep moist at all times for fastest growth and development. In production a soggy soil mix is a recipe for fungal and bacterial problems, so use a well drained mix.

Media – A well drained mix with a pH of 5.5-6.5 is best but as the plants will get quite tall it is often recommended that some sand be used in the containers to act as ballast once plants begin to reach mature height.

Production Temperatures – The plant will do well up to about 70°F, but flowering begins to be reduced above this point as heat stress kicks in. Production temperatures should be around 55-60°F to keep plants shorter and increase flowering. While these are the recommended temperatures, the plants can be grown under warmer conditions and still flower. I have grown this crop in the south under shade, but growers need to be vigilant for pathogens when growing under warm conditions.

Light level – Tolerant of most light levels up to 5000 ft. candles. Too much shade reduces both leaf size and flower stem strength. Under warmer conditions, more shade will be required.

Propagation – Care should be taken to avoid prolonged storage of these tubers as they will not undergo complete dormancy as the colored forms do. Commercially propagated by seed, tissue culture, and division. Larger rhizomes produce larger plants and flowers.

Crop timing – Allow 11-14 weeks from planting for the emergence of the first flower. Usually peak flowering is about 2-4 weeks after the first flower opens.

Growth regulators – GA is not needed for this group of hybrids. In cut flower production most will benefit from a GA spray of 80-250 ppm to aid in flower stem elongation. To control elongation and tone plants before sale, Paclobutrazol can be applied as a drench when plants are 1/2-2/3 salable size, rates vary depending on production conditions but

somewhere in the 4-7 ppm range. Start with lower rates and reapply if needed.

Flowering – While flowering will occur when plants are grown cool, the size and number of flowers is also dependent on fertility, volume of container, size of rhizome/tuber planted, and soil moisture. Rhizome size will also ultimately influence the number of flowers produced, but results are variable.

Hybrids - Many depending on supplier but major groups include: Green Goddess (also sold as Green Desire), Pink Mist, Red Desire, *Z. childsiiana*, "Apple Court Babe", "Crowborough", "Little Gem", and "White Sails", as well as the standard white form of the species. There are both dwarf and standard forms of the plant. Interesting side note: This plant is considered an invasive exotic in certain regions of Australia.

Sources for more information on Calla lilies and Calla production:

Golden State Bulb Growers, PO Box 1120
Watsonville, CA, 95077

Phone (831-728-0500, FAX 831-761-1282

Website: <http://www.goldenstatebulb.com>

Golden State Bulb Growers also produce tuberous begonias, *Eucomis*, *Amaryllis belladonna*, and *Scilla peruviana*.

Classic Calla also sells both Green Desire and Red Desire forms of (*Z. aethiopica*)

Website: <http://www.classiccalla.com>

Many brokers also carry Calla tubers from a variety of sources, so check with your broker about availability.