

GUIDELINES FOR POT GROWERS

REV. 10/2006

Highest quality and uniform calla culture requires special attention to media selection water management, and forcing temperatures while employing a strong preventative fungicide program. Please read and follow these entire directions carefully. *The summary checklist of MUST DO'S are numbered 1 - 12 on page 9 below. However, proper culture is not limited to these twelve summarized points.*

1

TUBER TREATMENTS TO ENHANCE FLOWERING AND AID IN DISEASE

Each color or variety is unique in its growth habit and performance. Our CALLAFORNIA CALLAS® Tech Sheets CD is available through your broker. The Tech Sheets also are viewable on our website @ www.goldenstatebulb.com.

PREVENTION: Standard gibberellic acid, Progibb (GA₃) or Provide (GA₄₊₇) or Promalin (GA₄₊₇ with benzyladenine) treatments increase the total number of flowers per tuber. Generally, you can expect twice as many flowers with a GA treated tuber than with an untreated tuber. GA will slightly increase plant height, slightly reduce leaf width, and soften tissues, especially in low light and shorter days and in combination with high N fertilization. Subsequent Bonzi (paclobutrazol) application minimizes these effects. Order "**PRECONDITIONED**" TUBERS if you want tubers already treated with gibberellic acid plus disinfectants.

Most growers request that Golden State Bulb Growers (GSBG) precondition their Callaifornia Callas® prior to shipment. This saves growers considerable handling, reduces disease and justifies the small additional charge.

For non-preconditioned tubers, GA plus fungicides may be applied to tubers with a backpack sprayer. Avoid tank dipping to reduce possible pathogen spread.

If you purchase "**NOT PRECONDITIONED**" callas, your tubers should be **sprayed** with a fixed copper solution of copper hydroxide 37.5% (Champ II flowable) at 3 Tbsp/U.S. gal. (20 ml/L **OR** copper oxychloride 50 wp at 0.4 oz/U.S. gal. (3 g/L) plus Promalin at 100 ppm **OR** GA₃ (Progibb) at 125 ppm. **For dipping**, reduce Promalin to 75 ppm **OR** GA₃ to 100 ppm. Adding a fixed copper disinfectant to the GA solution will help control pathogen spread and reduce soft rot. The mixture must be agitated regularly. (Note: The Golden State preconditioning regime includes additional proprietary fungicides.) **Allow to air dry, without fanning, over several hours for full effectiveness of the materials prior to planting.**

GA should be added to the **spray mixture** at the following rates:

1. 1.8% Promalin* solution: a 100 ppm GA₄₊₇+BA mixture is 1.3 TBSP per U.S. gal H₂O (5.5 ml/L).
2. 4% GA₃ solution (Progibb): a 125 ppm mixture is 0.8 TBSP per U.S. gallon H₂O (3.1 ml/L).

**Promalin is the preferred compound over GA₃ as Promalin will not induce as many deformed flowers.*

2

RECEIVING AND HANDLING OF DORMANT TUBERS: Unpack on arrival. **Dispose of any soft rot and wash hands to avoid spreading the bacteria to healthy bulbs. Place in well-ventilated trays at 65°F for a couple of days prior to planting.** This will insure that any possible friction wounds caused by transit are well callused before planting. For long-term storage (6 weeks or more), keep well ventilated at 50°F and with a relative humidity of 80%.

SCHEDULING: Number of days between planting date and bloom decreases as the planting date is moved later in the year. Warmer temperatures and longer days accelerate growth. When potting callas October-December, the earliest and darkest plantings in the northern hemisphere, plan on 2-3 weeks more bench time to reach peak bloom. For such sub-optimal conditions, plan on using additional Bonzi, maintaining cooler finishing temperatures and optimizing available light.

With no exact scheduling perfected, some approximate averaged forcing times follow:



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APPROXIMATE TIME TO FLOWER EXPRESSED IN WEEKS*				
(arranged in order of early to late flowering)				
CALLAFORNIA CALLA® VARIETY NAME	JAN-FEB		MAR-MAY	
	FIRST FLOWER	PEAK (GA INDUCED) FLOWERING	FIRST FLOWER	PEAK (GA INDUCED) FLOWERING
LIPSTICK	8	9-10	7	8-9
DARK EYES	"	"	"	"
NEON AMOUR	"	"	"	"
LAVENDER GEM (Lavender Sensation)	"	"	"	"
AMETHYST (Purple Gem)	"	"	"	"
RUBYLITE PINK ICE	"	"	"	"
HOT FLASHES	"	"	"	"
PLUM PRETTY	"	"	"	"
POT 'O PORRIDGE	"	"	"	"
ROSE GEM (Gem Rose)	9	10-11	8	9-10
RUBYLITE ROSE	"	"	"	"
SUPER GEM (Supergem)	"	"	"	"
REGAL (Noble)	"	"	"	"
ALPINE	"	"	"	"
GARNET GLOW	"	"	"	"
MINT JULIP (Crème de Mint)	"	"	"	"
CRYSTAL BLUSH	"	"	"	"
INTIMATE IVORY	"	"	"	"
LEMONADE	"	"	"	"
DEVILS WINE	"	"	"	"
GOLD RUSH	"	"	"	"
GOLD CROWN	"	"	"	"
RUBY SENSATION	"	"	"	"
PINK DIAMOND	"	"	"	"
PINK (rehmannii) (Little Suzy)	"	"	"	"
LEMON DROP	"	"	"	"
PARFAIT	"	"	"	"
CORAL PASSION	"	"	"	"
STRAWBERRY PARFAIT	"	"	"	"
FIRE DANCER	"	"	"	"
TWILIGHT	"	"	"	"
FLAME	10	11-12	9	10-11
HYBRID YELLOW (Golden Star)	"	"	"	"
SUNSHINE (Sunny)	"	"	"	"
FIRE GLOW (Fireside)	"	"	"	"
CANDLE GLOW	"	"	"	"
BLAZE	"	"	"	"
PILLOW TALK	"	"	"	"
PINK GIANT	"	"	"	"
ANTIQUE	"	"	"	"
ALBO MACULATA (Little Jimmy)	"	"	"	"
MILLENNIUM GOLD	"	"	"	"
SOLAR FLARE	11	12-13	10	11-12
LEMON CHIFFON	"	"	"	"
PEACH CHIFFON	"	"	"	"
GOLDEN CHALICE	"	"	"	"
SWEET TALK	"	"	"	"
BRIDAL BLISS	"	"	"	"

*Reduce average first bloom date by 5 days when using 2 1/2-3" (20/24 cm) tubers.

3

PLANTING: PLANT WITH 1" TO 1 1/2" OF MEDIA OVER THE TUBER, ROUNDED SIDE DOWN, SPROUTS (EYES) UP. Pot sizes below 4 1/2" standard are more difficult to grow due to root volume restriction (especially in clay pots). Additional care and management of fertility and irrigation are required in small or shallow pots because plants tend to be weaker, more easily stressed and, therefore, more disease prone.

RECOMMENDED PLANTING DENSITIES FOR PRODUCING HIGH QUALITY CALLAFORNIA CALLA® POTS		
POT SIZE	TUBERS PER POT BY SIZE	EQUAL PERFORMANCE SUBSTITUTION
4 1/2"	1 @ 1 3/4"* OR 2 @ 1 1/4" OR	2 @ 1 1/4" = 1 @ 1 3/4"
5"	1 @ 1 1/2" 1 @ 2 1/4"* OR 2 @ 1 1/2" OR 1 @ 2"	2 @ 1" = 1 @ 1 1/2" 1 @ 1 1/2" + 1 @ 1 3/4" = 1 @ 2 1/4" 2 @ 1 1/2" = 1 @ 2"
6"	2 @ 1 3/4"* OR 1 @ 2 1/2"* OR 1 @ 2 1/4" OR 1 @ 2"	2 @ 1 3/4" = 1 @ 2 1/2" 3 @ 1 1/4" OR 1 @ 1 1/2" + 1 @ 1 3/4" = 1 @ 2 1/4" 2 @ 1 1/2" = 1 @ 2"
7"	3 @ 1 1/2"* OR 1 @ 2 1/2"	1 @ 3" = 3 @ 1 1/2" 2 @ 1 3/4" = 1 @ 2 1/2"
8"	3 @ 1 3/4"* OR 3 @ 1 1/2"	2 @ 2" = 3 @ 1 3/4" 1 @ 3" = 3 @ 1 1/2"
Gallon Cans	1 @ 2"* OR 1 @ 1 3/4"	2 @ 1 1/2" = 1 @ 2" 2 @ 1 1/4" = 1 @ 1 3/4"

*Best combination for top-quality pot.
Grades: 2 1/2" IS 2 1/2" up; 2 1/4" IS 2 1/4-2 1/2"; 2" IS 2-2 1/4"; 1 3/4" IS 1 3/4-2"; 1 1/2" IS 1 1/2-1 3/4"; 1 1/4" IS 1 1/4-1 1/2"
" " 20+cm; " " 18/20cm; " " 16/18cm; " " 14/16cm; " " 12/14cm; " " 10/12cm

4

MEDIA: The medium should be well drained, a pH of 6-6.5 and have good air porosity (optimal porosity at 20% ±5%). Peat based media should use a coarse grade and be in the range of 30-50% of the mix. Lighter fractions, raising less gas, are suitable for earlier planting and higher pH. Higher proportions of peat are used by experienced growers, but at the risk of enhancing diseases. Additional well drained components include, but are not limited to, *graded* large particle perlite, sand, firbark, pumice or scoria. Redwood sawdust should not make up more than 30% of a mix. Pine bark is known to tie up Bonzi variably and should be used with care or avoided. *Graded* No. 2 sand can help ballast pots on taller varieties. **Incorporation of gypsum/lime** will help not only pH balance, but provide calcium for good plant health. A light two-week starter charge of a balanced fertilizer will help plants get off to a fast start. When mixing media, care must be taken to not over-grind components. The resulting reduction of particle size in such media will reduce aeration to the point of favoring root pathogens.

We recommend incorporation of *Trichoderma* biologicals such as **Root Shield** (1 lb/yd³) or **Soil Guard** (12 oz/yd³) into the media 3-7 days before planting to promote optimal root health, especially where fungicide labels are restricted.

Sample media: 3 parts Coarse Peat : 2 parts Large Perlite :
2 parts 1/8-1/4" Firbark : 1 part #2 Graded Sand (optional for ballast)

A note on coco peat/coir: Coir that is high quality and salts free has been used with mixed results. In cut flowers, some improvements in flower and stem quality have been observed. However, in pots, an overall greater incidence of water molds (pythium) has also been observed. Consequently, we do not recommend coir. If coir is incorporated, the grower does so at their own risk. If using coir despite our warnings, we strongly recommend strict adherence to our preventative fungicide drench program.

PLANT HEALTH & GROWTH: The *bacterial soft-rot syndrome*, which concludes with *Erwinia carotovora*, is generally preceded by water molds and *Rhizoctonia*. Other wounds or stresses also add to this profit-impacting pathogen complex. It is very important to follow media recommendations, use good sanitation practices and proper water, preventative drench and temperature management. **In early forcing, most calla diseases are favored by overly wet and cold conditions. In summer growth, overly wet and excessively warm day and night conditions are also conducive to disease and soft rot. Follow our recommendations for well-drained and good air porosity media, optimal fertility and salts management, as well as our preventative, three-component fungicide drench program, addressing *Pythium*, *Erwinia* and *Rhizoctonia*. See Drench section.**

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ENVIRONMENTAL AND TEMPERATURE EFFECTS ON PLANT PERFORMANCE:

Optimal environment involves good air circulation, moderately high relative humidities and the **highest possible light** (only in hot and bright summer forcing conditions will 30-50% shade be necessary). High light yields more compact plants, more flowers and reduces the need for Bonzi. Consistent temperature regimes for each stage and avoidance of temperature extremes greatly enhance plant performance and health.

Recommended temperatures are stage dependent:

Stage #1 – about 12-25 days, from planting to 1-3" sprouts; 75°F (24°C) days and 65°F (18°C) or a constant 68°F (19°C). Even, early heat improves determinance. Bonzi is to be applied beginning at this 1-3" sprout stage.

Stage #2 – begins approximately one week after sprouting and initial Bonzi application and continues approximately from day 21 - 28 to day 50. Maintain 70°-75°F (21°-24°C) days and 55 - 60°F (12 - 15°C) nights. Note that nights can be cooled an additional 2-5° F (1-2° C) especially if light is poor or extending bench time is desired. (Cooling nights will reduce paclobutrazol use and plant height and will delay plant spacing, but will add some bench time.)

Stage #3 – is marked by flower buds beginning to push and color. This is approximately between days 50 and 75. Maintain 65°F (18°) days and 50°-55° (10°-13°C) nights. Even cooler temperatures can be used [2°-5°F (1°-2°C) lower than those above] during stages 2 and 3 and may be advised under poor light or no Bonzi culture. Such cooler temperatures will improve plant habit and reduce (or even eliminate) Bonzi requirements but will lengthen bench time as well as increase water retention in the media. Note that temperatures of 50°F (10°C) and below start to arrest calla growth.

NEGATIVE DIF/MORNING COLD PULSE: Providing a cold pulse during the early morning hours after leaves unfurl can greatly improve compactness of plant habit and reduce paclobutrazol use/expense. So long as one does not appreciably lower average forcing temperatures when providing a 5 to 8 am temperature drop, this technique does not lengthen forcing times.

The only way to speed bloom in callas is to increase temperatures. But, warm temperatures, especially under low light, will produce taller and softer plants. Early pale foliage with chlorotic leaf "checkering" usually indicates excessive heat. So, for timing your crop, it is better to plant early and slow it down with cooler temperatures than to plant late and have to add heat in Stages 2 and 3.

HUMIDITY AND AIR FLOW: Horizontal air flow, usually by fans hung in series around the greenhouse, is important in creating a non-stagnant and uniform plant environment throughout. Overly dry conditions reduce leaf widths, lessen general fullness and vigor and can even impact number of sprouts. Conversely, constant and overly humid (and excessively hot or cold) conditions can favor foliar diseases and root diseases, especially with no horizontal air flow and in low light and/or crowded plant conditions.

6

WATER MANAGEMENT is critical. Keep pots moist but avoid excessively wet and excessively dry conditions. After initial wetting at planting, the first thorough watering (within 4 days of planting "preconditioned" tubers) should be a three-part preventative chemical drench (see Fungicide Drenches and Pesticides section No. 9 below). Then, water sparingly until leaves unfurl. In day 14-21 do a second chemical drench. Pooling and splashing will spread disease. For this reason, ebb-and-flood systems can be risky. Alternate extreme dry then extreme wet conditions will cause root injury and will greatly increase pathogen susceptibility, especially if slow-release fertilizers are used in warm conditions. The addition of Zero Tol at 1:1000 to 1:3000 for algae control is compatible with, and recommended for forcing callas as it assists in disease management. (See section No. 9–Fungicide Drenches and Pesticides.). **Good quality water at an E.C. below 1.5 sustains plant quality, growth and overall plant health. High salinity or other water problems should be treated.**

7

FERTILIZATION: The ideal starter fertilizer precharge would be a 10-20 day soil incorporated application of N-P-K at approximately 15-3-15 (plus minors, if possible). Keep pots moist and E.C. levels between 1.5-2.0. Avoid E.C. levels above 2.5. It is best to avoid ammonia forms of nitrogen. We recommend growers use a constant 100-150 ppm balanced liquid feed which includes minors. Reducing the concentration in low light or poor growth conditions is advised. Uniform incorporation of slow-release or other granular fertilizers can be difficult, but can be done in individual pots by using approximately a 1.5 gram (1 tsp) of 15-3-15 well mixed into a 6-inch pot. Slow-release charges over 30 days tend to induce leaf margin salt burn if temperatures rise to above 78°F (25°C) and if pots dry excessively. Supplementing the media with 3 lbs. each of lime and dolomite per cubic yard can provide calcium for plant quality and disease tolerance. **Keep climate, growth and fertility records for future reference.**

Leach pot salts with clean water every third - fifth irrigation starting at leaf unfurling and especially during the last 6 weeks, particularly if producing small pots.

8

**BONZI
now has
EPA label
for Callas**

PLANT GROWTH REGULATION: **Bonzi (paclobutrazol @ 0.4% ai) is the most effective growth regulator and plant "toner" or "toughener."** The individual grower's product objectives and environments must be considered in Bonzi use. Factors other than concentration (ppm) greatly influence Bonzi efficacy. As Bonzi use is an art as well as a science, take notes on your environmental conditions (media moisture at time of application, temperature and light conditions post application, etc.) in order to achieve repeatable results next time. Apply Bonzi when all sprouts have emerged and are between 0.5" to 3" tall. Pots must be uniformly moist. So, it is best applied a day or two after an irrigation or the second fungicide drench. Segregate pots by sprout size treating tallest pots first. Then, when slower pots reach 0.5" to 3" sprouts, drench these pots also. Second and subsequent applications are usually made 6-10 days after the previous one. Do not treat after 40 days post emergence. Too much Bonzi will reduce flower counts and add bench time. However, Bonzi use will greatly improve post harvest shipping quality. Slightly higher rates are favored for shipping longer distances. **Use caution if and when "injecting" Bonzi. Better yet, avoid using injectors to apply Bonzi.** Paclobutrazol is a very effective and persistent PGR. Therefore, a small deviation from your desired rate and the volume applied may lead to substantially varying results. Since injectors are prone to deviate and or drift from the setting shown (i.e., 1:200), regular maintenance and calibration of injectors is essential to successfully "inject" your Bonzi. Additionally, keep in mind that the Bonzi concentrate will be pulled from the concentrate tank in the form of a "pulse" or "dose." Without the use of a blending tank, your crop will receive varied rates of material. Ultimately, injectors will serve growers best in the roles of delivering fertilizer and/or fungicides, where deviations from rates are often more tolerable. **Our recommendation is to prepare a tank-mixed, final solution at your desired Bonzi rate and to apply it using a dosing/metering system, like a Dramm Chemdose™ or a Chemical Container Eze-Dose™, etc.** This method will allow you to deliver precisely the desired rate of Bonzi from a diluted, ready-to-apply volume of solution (i.e., 10 ppm = 0.33 oz/gallon OR 33 oz Bonzi/100 gallons water).

In the absence of the above mentioned specialized equipment, we suggest the following spray tank method: Remove nozzle tip from wand and reduce pressure at regulator. Test fill a measuring cup to determine "trigger pull" rhythm for approximate dosing (4 oz solution/4" pot; 6 oz solution/6-6.5 pot).

See our Tech Sheets CD or Tech Sheet printouts for specific recommendations regarding how much Bonzi to use by variety. Our conditions suggest we use 8-10 ppm [1/4-1/3 oz/gal (2.0-2.5 ml/L)] on "x-low" and "low" use varieties and 10-15 ppm [1/3-1/2 oz/gal (2.5-4.0 ml/L)] on "medium" and "high-use" varieties. Your experience and conditions may lead you to use different rates. In general, we recommend repeat applications at low concentrations (8-15 ppm) rather than single (or fewer) applications of higher concentrations. Note that solution volume per pot is as critical as ppm because Bonzi is trapped in the media and becomes concentrated if liquid is applied past runoff. A metering system is therefore advised. The above rates are based on moderate California light levels. We suggest drenching 6 ounces per 6-inch pot (177 ml per 15 cm pot) and 4 oz. per 4 1/2" pot (118 ml per 11 cm pot). **[Note: Certain media components such as pine bark can tie up Bonzi and reduce its effectiveness.]**

The plants must be actively growing for Bonzi to be taken up by the roots and assimilated. Cold dark conditions immediately post application will, therefore, greatly reduce Bonzi effectiveness. Keep your environment stable and within the recommended temperatures for consistent and replicable results. **Keep good records.** Slightly cooler temperatures in Stages 2 and 3 and high quality greenhouse coverings or supplemental lighting will also improve plant habit and tone. Factors reducing plant habit quality (causing weakness and stretching) include low light or short light hours, long periods of far red light (twilight), excessive nitrogen, high temperatures, plant crowding and poor ventilation.

9

FUNGICIDE DRENCHES AND PESTICIDES:

DISEASE CONTROL AND PLANT HEALTH: Achieving or maintaining quality plants for the entire length of the crop **require** cultural practices **focusing on preventative control of diseases**. Once established, diseases are difficult to control. Bulb stocks are field grown and every effort is made to ship healthy bulbs. The aggressive bulb preconditioning at GSBG is highly recommended and we consider it essential as the first step to disease prevention. Success in disease management is dependent on controlling three (3) primary pathogens that independently or in concert can cause root and/or bulb rot. These are Rhizoctonia, Erwinia, and the water molds, known as Pythium and Phytophthora. Not one or even two products can successfully control all of these pathogens, and controlling only a portion of this pathogen complex can sometimes lead to worsening of the other untreated pathogens. Product registrations and availability vary by locale, but our best recommendations or their alternatives must be followed to address each pathogen group. Media incorporation of the biological control Trichoderma is recommended as Root Shield @ 1 lb/yd³ (460gm/m³) or Soil Guard (Gliocladium is related to Trichoderma) @ 12 oz/yd³ (340gm/m³). These are compatible with most fungicides and can help maintain healthy roots. Although less effective than incorporation, these biologicals can also be drenched at planting at 8oz/100 gal (60 gm/100L) but should not be used as a substitute for a preventative fungicide drenching. We recommend the use of Zero Tol (hydrogen dioxide 27% ai) at 1:1000 to 1:3000 for algae growth in constant feed as it has routinely proven to help manage pathogens.

The **first fungicide drench** is near planting. Using “preconditioned” tubers allows one to wait on the first drench to day 4 – 6 as roots initiate. We recommend a multi-part tank mix, addressing the three pathogens together. Using non-preconditioned tubers requires drenching in the first two to three days.

Our best four-part tank mix chemical recommendations for drenches are: for water molds, Subdue Maxx (mefenoxam 25.1% ai) @ 0.5-1 fl oz/100 gal (4-8 ml/100L) and Aliette (fosetyl-aluminum 80% ai) @ 13 wt oz/100 gal (98 gm/100L); for Rhizoctonia, Heritage (azoxystrobin 50% ai) @ 4 oz/100 gal (30 gm/100L); and, for the Erwinia bacterium, use Agrimycin-17 @ 8-16 wt oz/100 gal (60-120 gm/100L). The above components have been found superior at Golden State Bulb Growers for the labels registered in California, but all may not be available in your region. Remember that managing Pythium water molds is most critical. See our "Three Pathogen Calla Fungicide Drench Chart" below for these primary recommendations and other, lesser alternatives, should these not be available. Although callas tend to be tolerant to chemical phytotoxicity, trial other fungicides first on a small basis if our recommended chemicals are not labeled in your locale.

The Erwinia bacterium, leading to bulb soft rot, is best controlled with Agrimycin-17 (Streptomycin sulfate 21.2% ai) at 8-16 wt oz /100 gal (60-120 gm/100L). Alternatives for bacterial control are few and, therefore, GSBG's standard Bulb Preconditioning using fixed copper is essential. As drenches, these fixed coppers are root phytotoxic. Therefore, drenching of another agricultural antibiotic (at label rates) or use of soluble copper Phyton-27 (copper sulfate pentahydrate 21.4% ai) at 13-20 fl oz/100 gal (100-156ML/100L) can help. See chart for recommendations and alternatives.

DRENCH TIMING: Drench timing is critical. Drench the first time, when using preconditioned tubers, anywhere within 2 to 6 days of initial watering. If not using preconditioned tubers, drench within the first 2 to 3 days of initial watering. Timing of the second drench is important and should be made at 14 to 21 days after first drench and usually around the time of Bonzi application (provided Bonzi is applied within this 21-day period). A third drench is recommended for 21-28 days after the second one (day 40-47 from planting), but may only be necessary if weekly root inspections reveal cleared or browning roots, uneven growth, any diseased plants, or if poor or prolonged shipping environments may be expected.

Three Pathogen Calla Fungicide Drench Chart All rates below are recommendations per 100 gal () indicates they are per 100 liters	
(1) ERWINIA ⚡ Agrimycin-17 (streptomycin sulfate 21.2% ai) <i>powder</i> Phyton-27 (copper sulfate pentahydrate 21.4% ai) <i>liquid</i>	RATES 8-16 oz (60-120 gm) 13-20 oz (100-156 ml)
(2) WATER MOLDS ⚡ Subdue Maxx (mefenoxam 25.1% ai) <i>liquid</i> ⚡ Aliette (fosetyl-aluminum 80% ai) <i>powder</i> Terrazole (Etridiazole 35% ai) <i>powder</i> **	0.5-1 oz (4-8 ml) 13 oz (98 gm) 4-6 oz (30-45 gm)
(3) RHIZOCTONIA ⚡ Heritage (azoxystrobin 50% ai) <i>powder (also Pythium control)</i> Prostar (flutolanil 70.0% ai) Medallion (fludioxonil 50% ai) <i>powder</i> ** Compass (trifloxystrobin 50% ai) <i>powder</i> 3336 Clearys (thiophanate methyl 46.2% ai) <i>liquid</i> 26019 Chipco ((iprodione 50% ai) <i>powder</i>	4 oz (30 gm) 3-6 oz (22.5-45 gm) 2 oz (15 gm) 5 oz (37 gm) 20 oz (156 ml) 6.5 oz (49 gm)
⚡ Primary recommendation four-part tank mix ** Especially in Terrazole, and to a lesser extent in Medallion, we have very effective pathogen controls. However, some delay (3-6 days) in early growth, under sub-optimal conditions, has been observed. For these reasons, we have removed these two effective materials from our first and primary drench recommendations. ** Aliette combined with Phyton-27 can occasionally be phytotoxic for foliage. Be careful not to get this combined mix on the foliage.	

If any of these products are not available in your locale, then address the three major pathogens comprehensively with the best products available. Consult your local farm advisor. Callas tend to be tolerant of most products, and we encourage experimentation (and record keeping) with new products or combinations on a trial basis. One such promising new product is the nutritional supplement potassium silicate, called Pro-Tekt (a Dyna-Gro product); which, in our trials, has demonstrated immune supportive benefit. Silicates are also correlated with stronger stems and tougher leaves more resistant to foliar pathogens.

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INSPECT POTS WEEKLY for cleared or browning roots and be sure to redrench as above if root problems are discovered. These chemicals will lose their effectiveness with time. The same is true of Trichoderma. For this reason, repeat drench with Trichoderma at 21-28 days and, if necessary, near day 42 as well.

Leaf Spot: As leaves unfurl, watch for leaf spot, and, if present, spray foliage with Champ II (copper hydroxide 37.5%) at 1-2 qt/100 U.S. gal. (2.5-5.0 ml/L) plus Dithane (mancozeb) at 1 qt/100 U.S. gal. (2.5ml/L) for bacterial problems. For fungal leaf spots, use Daconil Weather Stik (ai chlorothalonil @ 54%) at the rate of 22 volumetric ounces per 100 gallons (1.72 ml per liter) or use Chipco 26019 26GT (ai Iprodione @ 23.3%) at the rate of 32 volumetric ounces per 100 gallons (2.5 ml/liter). If both bacterial and fungal leaf spots are present, do a tank mix of above and watch residues at the higher rates. Reduce guttation leaf-tip droplets by modifying greenhouse environment and ventilation. Guttation droplets can sometimes result in small necrotic spots due to salt concentrations along leaf margins, especially during times of high temperatures, overly dried pots and excessive fertilizer release with temperature-dependent slow-release fertilizers, or a lack of the recommended clear-water leachings. Do not combine foliar coppers with Aliette.

Leaf tip clearing at emergence, which we refer to as “vidrio” can lead to foliar disease in dark, humid conditions and must be treated as above immediately to prevent worsening of disease. Also improve ventilation.

11

GREENHOUSE SANITATION: *Always remove diseased plants from the greenhouse. Sanitation is critical, especially in multiple cropping programs where rot can progress without an obvious cause. Between crops, sanitize bench, floor, conveyors, pots, soil mixers, etc. See also control of Fungus Gnats and Shoreflies below.*

12

INSECTS: **Control of Fungus Gnats and Shoreflies is important due to their ability to spread bacteria and disease.** Generally, callas are relatively tolerant to phytotoxicity of foliar sprays, and label rates of most insecticides can be used safely. Controls on an as-needed basis for white flies, aphids and thrips are recommended. Early leaf-chewing evidence by larvae after sprouting requires an insecticide drench as soon as possible.

Control thrips as they can sometimes rapidly spread the foliar viruses INSV (Impatiens Necrotic Spot) and TSWV (Tomato Spotted Wilt). Control aphids as they can spread DMV (Dasheen Mosaic Virus).

ALWAYS WATCH FOR ERWINIA INFECTED PLANTS AND CAREFULLY REMOVE AND DISCARD.

THESE INSTRUCTIONS ARE NOT A PRESCRIPTION OR GUARANTEE, NOR RECOMMENDATIONS OR ENDORSEMENTS OF CHEMICALS MENTIONED.

MUST DO STEPS	PAGE NO.
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1) Order only <u>Preconditioned Callaformia Callas® Tubers</u>	1
If purchasing non-GA'd/"Not Preconditioned" tubers, follow new recommendations for disinfectant and GA spraying.	
2) Sort and air dry bulbs before planting.....	1
3) Plant with only 1 to 1 ½" of media covering tuber.....	3
4) Use well-drained media with good porosity.....	3
(Incorporation of Trichoderma biologicals is beneficial.)	
5) Follow optimal temperature regimes by stages.....	4
6) Follow proper water management recommendations.....	4
7) Follow fertility recommendations and avoid ammonium.....	5
forms of nitrogen. Clear water leach every third to fifth irrigation.	
8) Plant growth control and Bonzi require special.....	5
considerations and record keeping.	
9) Drench within 4 - 6 days of planting "preconditioned".....	6
tubers using the chemical combinations mentioned.	
10) Redrench with our recommended strong preventative.....	7
program day 14 to 21 (pre Bonzi) and again day 40-47.	
11) Maintain greenhouse sanitation.....	8
12) Control fungus gnats, shoreflies and chewing larvae as.....	8
well as thrips and aphids for virus vector control.	