

CALLAFORNIA CALLA® **SUMMARY GUIDELINES for CUT USE**

REV. 03/2015

START with GSBG Grower “Clusters”

- Bulbs are pretreated with a blend of fungicides/bactericides intended to get plants off to a good start.
- Follow up with preventative drenches as detailed later in the “*Disease Prevention & Control*”.

MEDIA

Callafornia Callas prefer “even moisture” while avoiding dry/soggy conditions and/or “wet feet”:

- Use a **sterile, deep, well-draining media** with a pH of 6.0-6.5 that is high in organic matter.
 - Suitable medias contain 30-50% coarse peat and 20% ±5% porosity, using coarse components for drainage.
 - Container medias frequently benefit from 10-20% *rice hulls* for additional drainage and silicate availability.
- ↳ *Low pH can impede growth- especially in field conditions.*

Disease suppression can be partially addressed with soil incorporation of the following materials:

- Gypsum/lime/dolomite can improve pH balance and offer calcium supply for plant strength & disease resistance.
- RootShield (Trichoderma) @ 1lb/yd³ (593gm/m³) aids to reduce disease pressure using beneficial organisms.
 - ◇ *See also Disease Prevention & Control section* ◇

PLANTING

- Selected containers should be deep/tall with elevated “feet” and many drain ports to optimize drainage physics.
 - Plant bulbs rounded side down and eyes/sprouts up with 2-4” (5-10cm) of media over the bulbs.
 - *Narrow-leaf varieties produce longer/sturdier stems when planted on the deeper end of the spectrum.*
 - *Large-leaf varieties are protected from excess moisture when planted on the shallower end of spectrum.*
- ↳ *Roots develop from the top of the bulb; planting too shallow may lead to stress and/or weak performance.*
- ↳ *Bulbs planted upside-down will result in plants that exhibit no “central” growth and deeper, wetter roots.*
- ↳ *Planting bulbs on their sides/vertically will produce growth like “fans” or “flatfish” (i.e. flounder/halibut).*

GROWING CONDITIONS

The crop **withstands a wide range of light conditions** from 4,000 to 8,000 foot-candles (43,000-86,000 lux).

- Higher light can be tolerated during cool & humid periods.
 - Rapid PAR assimilation can prematurely trigger flowering; reduce light during brighter/warmer conditions.
 - Plants can handle full sun to 40% shade without becoming too badly stressed, 30% shade is often optimum.
- ↳ *Callafornia Callas are not day-length sensitive nor do they require temperature treatments to induce bloom.*

↳ *Vigorous large-leaved varieties benefit from higher light and additional space, improving balance and floral productivity.*

↳ *Very low light levels and/or crowded conditions may inhibit optimal flowering, stretch/weaken stems and/or soften color.*

Callafornia Callas are relatively robust growers that **tolerate various temperatures but truly prefer relatively moderate-to-cool “staged” conditions after germination.** Optimum temperature for plant growth & flowering are as follows:

- **Stage #1 - Root & Sprout Development:** Days @ 75°F (24°C) / Nights @ 65°F (18°C) **OR** a constant 68°F (20°C)
 - Early & even heat improves uniformity, vigor and determinance from aggressive rooting & eye activation.
- **Stage #2 - Leaf & Canopy Development:** Days @ 65°-75°F (18°-24°C) / Nights @ 60°F (16°C).
 - Avoid “cold pulsing” since it leads to shorter plants and stems.
 - **Stage #3 - Bloom Push & Coloration:** Though pots are commonly switched to Days @ 65°F (18°C) / Nights @ 50°-55°F (10°-13°C)... this can significantly impact stem length on shorter narrow-leaf varieties.
 - Large-leaved varieties benefit from Nights @ 55°F (13°C) for shorter leaves, more flowers & better color.
 - Maintain “Stage 2” on narrow-leaf varieties for best results= no lower than Nights @ 60°F (16°C).

↳ *Under poor light conditions, it is advisable to cool nights an additional 2-5°F (1-2°C) in “Stages 2 & 3”.*

↳ *Cool nights with clear days will tone plants- promoting stronger but shorter stems and more vibrant flower colors.*

Other temperature considerations are as follows:

- Avoiding high temperature spikes will help minimize stress and associated disease pressure.
- Prolonged warmer greenhouse temperatures, especially at night, loosens plants and inhibits coloration.
- Callafornia Callas are rather sensitive to frost; foliage will not withstand prolonged freezing temperatures. Bulbs will take some frost but cannot withstand a soil freeze to bulb depth.

↳ *Speed growth through increasing temperatures but it leads to softer growth, stretching and muted colors.*

↳ *Slow or harden plants through reducing night/day temperatures in late “stages” but this can shorten stems.*

Callafornia Callas benefit from relatively **high humidities**, which tends to produce more “lush” and vigorous growth with broader leaves. Constant overly humid and excessively hot or cold conditions favor foliar diseases and/or root diseases.

- Provide sufficient airflow (i.e. HAF [horizontal air flow] and give adequate spacing to crop.
 - ↳ *Low relative humidities will act to reduce leaf widths, lessen general vigor and fullness.*

WATER MANAGEMENT

- Irrigations should be full and thorough while also being appropriately timed based on conditions.
- Water in freshly planted bulbs, and then follow with recommended “cocktail drench” within 2-3 days.
- Maintain moderate soil moisture until substantial sprouts emerge.
- As canopy/evapotranspiration advances, maintain uniform soil moisture while avoiding soggy conditions.
 - ↳ *Excessively wet/dry/high salts media can result in stress leading to root injury and increased pathogen susceptibility.*
 - ↳ *Dry stress can further impact flowering (i.e. shorter stems, abortion and/or blindness).*
 - ↳ *Leaves remaining wet overnight from irrigations, sprays or rainfall may be subject to foliar pathogens.*
 - ↳ *Pooling and splashing can easily spread diseases.*

FERTILITY

Proper fertility is critical for full plant growth with well-colored leaves and optimal floral productivity in Callaifornia Callas.

- Callaifornia Callas don't require nor benefit from high constant fertility.
- Use a soil incorporated 30-day release preplant charge of nitrogen and potassium (containing little or no phosphorous). This will produce good early establishment of roots and improved early vigor.
- Begin with 150ppm N weekly of a semi-balanced blend [+minors] such as 20-10-20 and include routine applications of Calcium Nitrate. Some prefer to alternate between Calcium & Potassium forms of Nitrate.
- Modifications can then be made based on individual growth objectives and conditions.
 - At leaf unfurling, reducing N to 50ppm keeps plants from getting too leafy and improves floral productivity.
- ↳ *Large-leaved varieties benefit from earlier reduction of N ppm for improved balance/flowering; reduce at sprouting.*
 - ↳ *Leach once canopy develops at a ratio of 3-4 fertilizer : 1 water to avoid salt edge burn.*
 - ↳ *Pale foliage color can be corrected with sequestered iron chelate at a rate of 6oz/100 gal (46.9 mls/100 L).*
 - ↳ *Alternately, consider the use of a low phosphorous fertilizer (i.e. 17-5-17) as it can result in better plant balance.*

Other fertility considerations are as follows:

- Maintain E.C. levels initially between 1.5-2.0, then reducing to 1-1.2 once canopy has developed.
- Avoid E.C. levels above 2.5; noting that high salts with periods of dryness leads to root damage.
- Avoid ammonia forms of nitrogen since it is linked to increased erwinia pressure.
 - ↳ *Additional calcium assists in strengthening cell walls of leaves and flowers, plus improves disease resistance.*
 - ↳ *Excessive nitrogen can lead to “lush” growth and reduced floral productivity.*
 - ↳ *Fertilizer applied to leaves in warm and bright conditions may cause phytotoxicity.*

CROP HEIGHT & STEM LENGTH

It is important to provide adequate crop spacing and optimize cultural inputs to achieve optimal cut-flower results.

Numerous variables can separately or together affect growth habit, these include but are not limited to:

- | | | |
|---------------|--------------------|------------------|
| • light | • fertility | • plant spacing |
| • temperature | • water management | • planting depth |

Callaifornia Calla bulbs are shipped from October through the following September, which leads to differing sprout length at the time of supply:

- Early season bulbs are “fresh” with a minimum or relatively short amount of dormancy prior to planting.
 - These bulbs have no-to-limited sprout development and often are grown into progressively shorter days.
 - Bulbs supplied mid-late season will arrive with obvious-to-significant sprout development and often grow in relatively long-days.

These sprouting and light quality factors should be taken into consideration when determining appropriate cultural adaptations (light vs. shade, warmer vs. cooler temperatures, fertility, etc).

Flower quality and productivity can be enhanced with a GA spray applied @ 80-120ppm GA3 or GA4+7 & BA6 [NO surfactant] as 1st flower buds become visible. Spray volume should deliver 1.25gal/1000ft² (5.1L/100m²).

DISEASE PREVENTION & CONTROL

Callaifornia Callas are generally susceptible to **three (3) primary soil borne pathogens**: Pythium & Phytophthora (“water molds”) plus Rhizoctonia and bacteria: Erwinia (Pectobacteria spp.). “Water molds” are often the first and most critical component in the disease complex, followed by Rhizoctonia. Once root injury occurs, Erwinia will often enter as a secondary infection.

Our best tank mixed, four-part chemical drench targets the “3-pathogen complex” with the following preferred materials:

- 1) WATER MOLD *part 1- Subdue Maxx* (mefenoxam 25.1% ai) @ 0.5-1oz/100 gal (4-8ml/100 L)
 - 2) WATER MOLD *part 2- Aliette* (fosetyl-aluminum 80% ai) @ 13oz/100 gal (97gm/100 L)
 - 3) RHIZOCTONIA- *Heritage* (azoxystrobin 50% ai) @ 0.9oz/100 gal (6.7gm/100 L)
 - 4) ERWINIA- *Agrimycin-17* (streptomycin sulfate 21.2% ai) @ 8-16oz/100 gal (60-120gm/100 L)
- ◇ Please refer to "CALLAFORNIA CALLAS POT CULTURAL GUIDELINES for POT USE" for additional details ◇

4-PART
TANK
MIX***Pesticide drench timing is critical.**

- The 1st drench should occur within 2 to 3 days of initial watering.
- Timing of the 2nd drench should occur as leaves begin to unfurl, generally at week 4 to 2 [early vs. late season].
- A 3rd drench may be necessary as crop enters flower bud stage, ranging from week 12 to 7 [early vs. late season].
↳ Always drench in the mornings or early enough for all foliage/runoff to dry thoroughly.

Watch for leaf spot as leaves unfurl. Once leaf spot is observed, spray foliage to runoff with a selection of the following:

- 1) BACTERIAL LEAF SPOT *part 1- Champ II* (copper hydroxide 37.5%) @ 32-64oz/100 gal (240-479ml/100 L)
- 2) BACTERIAL LEAF SPOT *part 2- Dithane* (mancozeb 75%) @ 32oz/100 gal (24 ml/100 L)
- 3) FUNGAL LEAF SPOT *option 1- Daconil Weather Stik* (chlorothalonil @ 54%) @ 22oz/100 gal (165ml/100 L)
option 2- Chipco 26019 26GT (iprodione @ 23.3%) @ 32oz/100 gal (240 ml/100 L)

↳ DO NOT COMBINE FOLIAR COPPERS WITH ALIETTE OR OTHER ACIDIFYING PRODUCTS.

◇ Refer to "CALLAFORNIA CALLAS POT CULTURAL GUIDELINES" for lower residue options and additional details ◇

Noninfectious Leaf Damage can be caused by a number of factors; things to watch for and prevent include the following:

- **Leaf spot phytotoxicity** can occur when using overhead irrigation on bright, warm days and/or pesticide sprays remaining "active in solution" for an extended period.
- **Edema** can occur during early developmental stages. Also called leaf-tip "clearing", "glassiness" and "vidrio", it's caused by warm soil paired with low evapotranspiration and very high turgor pressures leading to cell rupture.
- **Guttation** or leaf-tip water droplets can result damage due to salt concentrations accumulating along leaf tips and/or margins. Prevent with leaching.
- **Leaf sheath decline** or "dirty socks" may sometimes occur (sheaths are stubby leaf-like appendages found below 1st leaf). Sheaths become chlorotic and/or desiccate. Prevent with routine leaching and avoid excessive drying.

Inspect Crop Weekly. Routinely scout for cleared or browning roots, leaf spots, etc.

- ALWAYS WATCH FOR ERWINIA INFECTED PLANTS TO CAREFULLY ROGUE & DISCARD.
- Re-drench per recommendations if root problems are discovered, up to a total of three times over the life cycle.
↳ Sanitation is critical, especially in multiple cropping programs where rot can progress without an obvious cause.

INSECTS

- Control **Fungus Gnats** and **Shoreflies** due to their ability to spread bacteria and other diseases.
- Control **white flies, aphids and thrips** on an as-needed basis. If aphid or thrips are present, use aggressive control measures since they are capable of inflicting flower/leaf damage and rapidly spreading various viruses.
- Watch for early **leaf chewing** evidence from **larvae** after sprouting.

Growers generally have preferred insecticides for the control of horticulturally important insect pests. Provided below is a quick reference sample listing for consideration: Abamectin (abamectin 2% ai); Conserve (spinosad 11.6% ai); Diazinon (diazinon 48% ai); Dursban (chlorpyrifos 50% ai); Endeavor (pymetozine 50% ai); Evergreen (pyrethrins 6% ai); ImidiPro (imidacloprid 21.4% ai); Malathion (malathion 56.8% ai); Mavrik (tau-fluvalinate 22.3% ai); Mesurool 75-W (methiocarb 75% ai); Orthene (acephate 75% ai); Overture (pyridalyl 35% ai); Pylon (chlorfenapyr 21.4% ai); Tempo (cyfluthrin 20% ai).

↳ See labels for appropriate rates, pests controlled, approved locations and methods, rotational requirements, etc.

↳ Most materials can safely be applied at label rates; beware of chemical incompatibilities described on label(s).

↳ Availability by state, region or country may vary; inquire with local agricultural advisors if you are in doubt.

HARVESTING FLOWERS

Cut-flowers should be selected for harvest once they are open, appropriately colored and generally prior to pollen shed. Some hybrids and oranges are however allowed to mature more to reach desired pigmentation.

- Pulling stems increases stem length and is a much quicker technique; not done properly leads to stem stretching.
- Cutting stems is faster but results in shorter stems.

↳ Soil & plants must have proper moisture/turgor levels to avoid stem stretching/plant damage; pre-misting canopy helps.

↳ "CALLAFORNIA CALLAS CUT CULTURAL GUIDELINES" offers extensive details regarding crop characteristics and optimal culture. Please visit www.goldenstatebulb.com

◇ These instructions are not prescription guarantees, nor are they recommendations and/or endorsements of any of the chemicals mentioned herein ◇