

## Cultural Guidelines for Commercial Production of Interiorscape *Calathea*<sup>1</sup>

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*Calathea* is a member of the family Marantaceae and native to tropical regions of the Americas. The total number of species in the *Calathea* genus has dramatically increased during the past 50 years, and taxonomists now list about 300 species. Calatheas are perennial rhizomatous or tuberous herbs and have undivided long elliptic to ovate leaves. Some species have only basal leaves while other species have their leaves on short stems. The leaves may be smooth and shiny or covered with small fine hairs depending on the species. Inflorescences of most species are borne terminally but hidden in their long petioled leaves. Only a few species, such as *C. crocata* and *C. loeseneri*, have inflorescences that project above the foliage canopy.

Among the cultivated species, *C. allouia* is produced for its small gritty tubers which are eaten like potatoes in the West Indies and northern South America. Some large-leaved species, such as *C. lutea*, are potential sources of commercial wax, resembling carnauba wax, which is obtained from the undersurface of leaves. Most other *Calathea* species are grown for their stunning attractive foliage. Their brilliant patterns of leaf color, texture, and elegance attracted wide attention as early as 1861. However,

production of calatheas as ornamentals was limited to just a few species until recently new species introduction. In 1975, only three species (*C. insignis*, *C. makoyana*, and *C. roseopicta*) were commonly grown in the USA; but now at least 15 species and about 35 cultivars are commonly produced. New cultivars continue to be released by tissue culture laboratories, primarily from somaclonal variants.

This article is intended to describe common cultivars grown in the foliage plant industry, provide guidelines for their culture and interior use, and list physiological problems that may be encountered during production and interiorscape use.

### Cultivars

See Table 1.

### Cultural Guides

#### 1. Propagation

*Calathea* species can be propagated by division. The rhizome is divided so each piece has at least one leaf and then planted in appropriately sized pots. Only few species, such as *C. micans*, can be

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propagated by seed. Currently, almost all commercial production uses liners from tissue culture.

## 2. Production

Liners are transplanted in either 6- or 8-inch pots and grown in shadehouses or shaded greenhouses. Soilless media formulated with peat, pine bark, vermiculate, and/or perlite with a pH around 6.0 and soluble salts of 1 to 2 dS/m are suitable for *Calathea* production. Plants should be grown under at least 80% shade (1000 to 2000 foot candles), with relative humidities between 50 to 100% and temperatures between 70 and 90° F.

If plants are fertigated via drip or ebb-and-flow irrigation, a nutrient solution with N at 150 ppm can be used. This solution can be made using a water-soluble fertilizer with N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O at a 3-1-2 ratio, such as a 24-8-16 or 18-6-12 with micronutrients. If a controlled-release fertilizer with the N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O ratio of 3-1-2 is used, apply it at rate of 3 lb N per 1,000 square feet on a monthly basis.

Potting media should be kept moist but not over-watered when controlled-release fertilizers are used. Growers are strongly recommended to monitor pH and the nutrient status of potting media by checking soluble salts levels at least monthly using pH and electrical conductivity (EC) meters. Media solution can easily be extracted by the pour-through method. If EC readings fall below 1.0 dS/m, additional fertilization is needed; whereas if EC readings are above 3.0 dS/m, growers should reduce either the frequency or amount of applied fertilizer.

**Table 2.** Nutrient concentrations in leaves considered low, medium, and high for *Calathea* growth.

Nutrient	Low	Medium	High
Nitrogen (%)	<3.0	3.0-4.0	>4.0
Phosphorus (%)	<0.5	0.5-0.8	>0.8
Potassium (%)	<2.0	2.0-4.0	>4.0
Calcium (%)	<0.5	0.5-1.0	>1.0
Magnesium (%)	<0.25	0.25-1.0	>1.0
Sulfur (%)	<0.2	0.2-0.4	>0.4
Iron (ppm)	<40	40-200	>200
Manganese (ppm)	<30	30-150	>150
Zinc (ppm)	<20	20-200	>200
Copper (ppm)	<10	10-50	>50
Boron (ppm)	<20	20-50	>50

It is recommended that fertilizer applications be reduced or eliminated one month before plants are shipped. Leaf nutrient concentrations listed in Table 2 provide a general guide for determining if *Calathea* is appropriately fertilized.

## Shipping and Interior Care

Shipping sleeves are needed for transporting finished *Calathea*. Recommended temperature range for shipping is 60 to 65° F as exposure to a temperature below 55° F may cause chilling injury. Irrigate the media thoroughly the day before shipping to reduce stress during transportation.

*Calatheas* tolerate an interior light level as low as 75 foot candles; but optimal light levels range from 150 to 200 foot candles. Plants maintain their aesthetic appearance better if relative humidity is kept between 40 and 60%. Allow the surface of potting media to dry slightly before watering. Temperatures should be kept between 65 and 80° F indoors.

## Physiological Problems

See Table 3.

**Table 1.** A listing of common cultivars of *Calathea* in Florida as of 2005.

Species	Cultivar	Characteristics
<i>C. fasciata</i>	Fasciata	Large round leaves, green with wide dark stripes on the upper leaf surface and a purple lower leaf surface.
<i>C. insignis</i>	Insgnis	Oblong leaves with wavy margins; yellow-green upper leaf surface having alternating large and small dark green spots; a purple lower leaf surface.
<i>C. kennedeeae</i>	Helen	Thick leaf with dark green margin, and "paint brush strokes" of the same color on a silver interior.
<i>C. loeseneri</i>	Kopper Krome	A sport of <i>C. loeseneri</i> with dark coloration under the leaf, giving the plant a darker, hardier look. The showy part of the inflorescence is a much darker pink than the species.
	Loeseneri	Green leaves with a lighter green mid rib. The lavender inflorescence is borne above the foliage.
<i>C. majestica</i>	Majestica	Light green leaves and pinkish-white stripes covering the upper leaf, purple lower leaf surface.
<i>C. makoyana</i>	Makoyana	Oval leaves that are cream or pale green with dark green oblong blotches along lateral veins.
<i>C. orbifolia</i>	Orbifolia	Bold, striped, luxurious foliage
<i>C. ornata</i>	Ornata	Oblong shaped dark green leaves with pink stripes going from the mid rib to the margin. The deep magenta underside makes this one of the most popular <i>Calathea</i> .
	Concinna	Smaller green leaves with dark green variegation.
	Corona	Silver colored leaves bordered by dark green margins.
	Cynthia	Dark green center with a 1 inch silver margin around the entire leaves and purple underside.
	Eclipse	Dark green leaves surrounded by a silver irregular shaped pattern turning back to a dark green margin.
	Maria	A sport of <i>C. roseapicta</i> . Bright silver leaves with dark green margins.
	Medallion	Similar to Picta Royale but faster growing and more prominent silver color in the mid-rib.
	Picta Royale	Dark purple foliage with a faint pattern of silver from mid rib to the end of the round to oblong shaped leaves.
<i>C. rotundifolia</i>	Rotundifolia	Dark green leaves with whitish bands between main lateral veins and paler beneath.
<i>C. rufibarba</i>	Rufibarba	Long slender leaves on a very upright plant. Dark green upper side with purple underside covered with tiny hairs.
<i>C. tigrinum</i>	Tigrinum	Large velvet-looking leaves striped with bold, alternating, light and dark green bands.
<i>C. variegata</i>	Variegata	Green with a median band of dark green above and paler with deeper green bands beneath.
<i>C. vittata</i>	Vittata	Lanceolate light green leaves with heavy white stripes from the mid rib to the leaf margin.
<i>C. zebrina</i>	Zebrina	Oblong light green leaves with wide dark stripes from mid rib to the leaf margin.

**Table 3.** Causes and effects of various physiological problems of Calathea.

Symptoms	Probable Cause	Treatment
Dead spots near leaf margins	Fluoride toxicity	Avoid using water and fertilizer containing fluoride.
Leaf marginal or tip necrosis	Low pH, excess fertilizer, particularly high Mn	Keep pH close to 6 and soluble salts between 1-2.5 dS/m in production and 1.0-1.5 in interiorscape. Recent studies showed that leaf Mn concentrations higher than 200 ppm was a cause of the problem.
Leaf chlorosis	Low fertilizer, over-watering, or high light levels	Increase fertilizer, particularly nitrogen and iron; reduce watering frequency, reduce light levels.
Leaf spotting and reduced foliage color	Plants take up too much potassium	Use fertilizer with an N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O ratio of 3:1:2.
Wilted leaves	Drought stress or root pathogens	Keep the potting medium uniformly moist but not wet. Check root systems to determine if they are infected by pathogens or nematodes.