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Cultural Guidelines for Commercial Production of Interiorscape *Spathiphyllum* [1]

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Spathiphyllum literally translates into "leaf spathe." It is commonly called Peace Lily, Snowflower, Spathe Flower, or White Anthurium. *Spathiphyllum* belongs to the family Araceae, has about 41 species, and originates from Panama, Columbia, Ecuador, Venezuela, the Malay Archipelago, Costa Rica, and the Philippines where it thrives in humid, tropical rainforest understories.

Peace Lily is an herbaceous evergreen with short, erect to creeping stems bearing tufts of foliage. Leaves are dark green and ovate to lanceolate. The inflorescence is a white, hood-shaped spathe sheltering a cream/white spadix covered with bisexual flowers. From an ornamental viewpoint, the spathes and spadices are called flowers rather than the tiny true flowers on the spadix. Inflorescences are produced seasonally or intermittently and can also be induced with chemical sprays.

Spathiphyllum cultivars are popular interiorscape plants in part because of the wide selection of cultivars ranging in height from 12 inches to 4 feet. Also, they are easy to care for and they are attractive plants, with dark green foliage contrasting with lily-white flowers. They can be grown in a variety of pot sizes and hold up extremely well in interiorscapes. NASA even praised them in the Clean Air Study for their ability to remove formaldehyde, benzene, and carbon monoxide from interior air.

The intent of this article is to describe common cultivars in the foliage plant industry (See Table 1), provide guidelines for their culture and interior use, and list physiological problems that may be encountered during production and interiorscape use (See Table 3).

Cultural Guidelines

1. Propagation

Propagation can be accomplished through division, tissue culture, or seed germination. Basal shoots can be separated from mother plants and potted in container substrates. Tissue culture is now the most common propagation method. Plantlets from tissue culture are grown in medium-filled, multi-cavity plastic liner trays. Liners are then planted into larger containers. *Spathiphyllum* 'Cupido' is exclusively propagated from seed in production.

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2. Production

Peace Lily requires container substrates possessing high water and nutrient holding capacities. Canadian peat at 50 to 60% in volume is often combined with pine bark, vermiculate, or coir as the container substrate for *Spathiphyllum* production. When using the pour-through method to extract root-zone solution, substrates should have an initial pH range of 1.0 to 2.0, during cooler periods. Plants should be grown under 1500-2500 fc, which is about 75% shade in winter and 80% in summer in Florida. Excessive light bleaches leaves and the resulting pale color is often misidentified as a nutrient deficiency.

Fertilizer rates vary according to temperature, 3-1-2 N:P_2O_5:K_2O at 3.0 lb. N per 1,000 square feet per month during warmer growing season and 2.5 lbs N per 1,000 square feet during the cooler season. If foliar sprays are used, they are best applied to the underside of the leaf since the upper side is waxy, and the spray will leave a gray residue. Growers are recommended to monitor media soluble salts and pH every 2 or 3 weeks using the pour-through method. Information regarding the pour-through method can be found at http://edis.ifas.ufl.edu/pdffiles/EP/EP07400.pdf. If the soluble salts reading is 1 dS/m, the plant will show nutrient deficiency if no fertilizer is provided during the growing season; if the soluble salts reading is 2 dS/m, nutrient levels are adequate; and if the reading is 3 dS/m or above, reduce either the rate or the frequency of fertilizer application. Table 2 provides a guide for determining if *Spathiphyllum* cultivars are appropriately fertilized based on leaf analysis. *Spathiphyllum* has rather thin but abundant leaves; keep container substrates moist during periods when temperatures exceed 80°F.

A general consensus among growers is that *Spathiphyllum* is more cold tolerant than other aroids. Our studies showed that exposure to 45°F could cause chilling injury in some cultivars, and delayed or reduced growth occurred when plants were exposed to 52°F for five days. Detailed information of *Spathiphyllum* responses to chilling temperatures can be found at http://edis.ifas.ufl.edu/pdffiles/EP/EP10100.pdf. The preferred temperature range for Peace Lily production is 70-90°F.

The market value of *Spathiphyllum* depends heavily on the presence of flowers. Most *Spathiphyllum* cultivars only flower from January to August. In order to have a year-round flowering, a foliar spray of gibberellic acid (GA_3, Pro-Gibb) at a concentration of 250 ppm has been widely used in flower induction. Our recent studies indicate that a one-time foliar spray of GA_3 at a concentration of 100 ppm can not only effectively induce flowering but also improve flower quality. Depending on cultivars, flowers will appear in 9 to 12 weeks after GA_3 spray. Thus, growers can program flowering time and optimal shipping dates with GA_3 sprays.

Shipping and Interior Care

Use sleeves when shipping to avoid damage to the thin leaves. Shipping temperatures can range from 55 to 60°F. Once placed in interior conditions, individual blooms may last for a month or so. Trim dead blooms and leaves as soon as possible. Avoid over-fertilizing, as high soluble salts will burn leaf tips and margins. Using a 20-20-20 water soluble fertilizer solution with a N level at 50 ppm once a month or maintaining a soluble salts range of 0.8 to 1.2 dS/m should be adequate under interior conditions. The most common problem is underwatering which causes the entire plant to severely wilt or, as it is known in the trade, “crash."

Another maintenance problem with *Spathiphyllum* is a tendency to accumulate dust on their leaves. Wipe with a damp cloth to remove dust and the occasional pest. An occasional light spray of leaf polish is also recommended to reduce dust accumulation.

Table 1. A listing of common cultivars available in Florida as of 2003.

Cultivar or Common Name	Characteristics
'Annette'	Petite with shiny, dark green foliage.
'Calypso'	Curly rounded leaves.
'Ceres'	Dense, standard green foliage.
'Cody's Color'	Smaller leaves and shorter bloom stalks.
'Cupido'	Fountain-like growth habit with hooded spathes.
'Debbie'	Mid-sized with broad leaves.
'Del Rio'	Very wide, low-growing spathes.
'Deneve'	Low but wide habit with the occasional green spathe.
'Domino'	The only variegated *Spathiphyllum* on the market.
'Figaro'	Dark, glossy foliage with wide spathes.
'Flower Power'	Well-rounded habit with tall, white and green spathes.
'Hi Ho Silver'	Light-colored veins, this is a variation of 'Ceres'.
'Jetty'	Fast growing with many blooms. More cold and heat tolerant than most.
'Knockout'	Ribbed, wide-spreading foliage with tall blooms.
'Lynise'	Standard green foliage with narrow spathes.
'Mauna Loa Supreme'	To 3 feet tall with 7-inch spathes.
'Pablo'	Olive colored leaves with ovate spathes.
'Patrice'	Sparse habit with varying lengths in bloom stalks.
'Petite'	Stout and compact habit.
'Piccolino'	Dark green foliage and early blooming time.
'Power Petite'	Dense growth for small containers.
'Sensation-Mini'	Just like 'Sensation', only bred for smaller containers.
'Sensation'	Enormous, dark green, ribbed leaves. Plant can reach 4 feet tall.
'Sonya'	Extremely compact.

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'Starlight'	Dark lanceolate leaves and stout bloom stalks.
'Sunlight'	Compact and robust with green-tipped spathes.
'Supreme'	In high demand with dark foliage and cupped spathes.
'Sweet Pablo'	Fast growing with consistent flowering.
'Taylor's Green'	Deep green and rounded foliage.
'Ty's Pride'	Large, oblique spathes in the midst of dark foliage.
'Vicki-Lynn'	More columnar than most *Spathiphyllum*.
'Viscount'	A fast-growing, year-round bloomer that has deeply ribbed foliage.
'Viscount Prima'	Large white spathes tower over glossy foliage.
'Wallisii'	Papery lanceolate foliage with similar spathes.

Table 2. Nutrient concentrations in leaves that are generally considered low, medium, or high for *Spathiphyllum* growth.

Nutrient	**Low**	**Medium**	**High**
Nitrogen (%)	<3.0	3.0-4.5	>4.5
Phosphorus (%)	<0.2	0.2-0.8	>0.8
Potassium (%)	<2.0	2.0-5.0	>5.0
Calcium (%)	<1.0	1.0-2.5	>2.5
Magnesium (%)	<0.4	0.4-1.0	>1.0
Sulfur (%)	<0.2	0.2-0.5	>0.5
Iron (ppm)	<50	50-300	>300
Manganese (ppm)	<40	40-300	>300
Zinc (ppm)	<20	20-200	>200
Copper (ppm)	<10	10-50	>50
Boron (ppm)	<20	20-70	>70

Table 3. Causes and effects of various physiological problems.

Symptoms	Probable Cause	Treatment
Leaves wilt or collapse and sometimes develop necrosis along leaf margins. Roots are sparse, sometimes with black tips.	Saturated soil medium.	Reduce irrigation frequency to improve soil aeration or utilize a potting medium with a higher pore space percentage. This is more likely to occur during cold weather when the plant's watering needs decrease.
Reduced growth and chlorotic leaves. This disorder frequently occurs during winter months when soil is cold.	Nutrient deficiency.	Foliar sprays are beneficial. Usually iron or manganese sprays are best. Magnesium additives are needed if chlorosis is only on the lower leaf margins. Sulfur and boron are also beneficial.
Leaves may be curled, pale, and chlorotic to necrotic. Often leaves have burned margins and tips, and flowering is sparse.	Excess light or temperature.	Reduce the light level to 2500 foot-candles or below and/or the temperature to 90°F (32.2°C) or lower. These plants will sunburn. If this is the case, remove the plant from direct sunlight.
Lack of flowering especially with young plants.	Plants are immature.	Plants grown for 9 to 15 months will usually bloom between February and April, depending on winter growing temperatures. Younger plants may be induced to flower using a foliar spray of 250 ppm of GA_3 (gibberellic acid). Flower size on GA_3-treated plants is generally smaller. Growth regulator application may not be legal in some regions. Check with the local extension office first.
Burnt tips and roots.	Excessive fertilizer.	Interior plants require less fertilizer than greenhouse plants. Therefore, adjust fertilizer regime to 1/4 strength suggested for commercial growers. Leaching prior to reducing fertilizer helps to eliminate this problem.

Table 3. Causes and effects of various physiological problems.

Stunted growth, black areas on leaves and death of some roots. Injury usually begins at leaf tips and progresses inward with necrosis. Mature leaves are more sensitive than new leaves. Injury can be both visible and invisible.	Cold and drafts or extended periods below 45°F (7.2°C). Amount of damage and tolerance to chill will vary with cultivars.	Keep daytime temperatures between 68 and 85°F (20 and 29.4°C) with a 5°F drop at night.
"Crashing" or wilting so severely that the plant droops to soil level.	Lack of water.	Simple and thorough watering is sufficient. Plants will resurrect in a matter of hours. Some damage may occur in the form of chlorosis and/or necrosis once the plant turgor is restored. Plants may droop in the late day if they are in bright light and temperatures are above 80-85°F even though potting mix is moist. This is normal. However, frequent drooping will result in brown tips and edges.