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Producing Vegetative Petunias and Calibrachoa

By John M. Dole, Brian E. Whipker and Paul V. Nelson

✉ Two stars of the booming vegetatively propagated beddingplant market are petunias and calibrachoa. These closely related species offer consumers rapid growth, a wide range of colors and durability. The vigor of petunias and calibrachoa, while great for consumers, presents a challenge to growers — too much of a good thing can make for tangled plants and shipping problems. In the following article we will discuss how to cost-effectively grow petunias and calibrachos with an emphasis on the areas we have been researching: propagation and growth (vine) control.

Cultivars

Most vegetatively propagated petunias are hybrids between the bedding petunia (*Petunia x hybrida*) and *Petunia axillaris*. Of course, the original seed-propagated bedding petunia is a hybrid between *P. axillaris* and *P. intergrifolia*. However, the reintroduction of *P. axillaris* genetics brought a greater emphasis on vigorous, trailing growth and postproduction durability. The first of the new cultivars were released in the early 1990s with the introductions of 'Supertunias'. Supertunias are vegetatively propagated because this group produces few if any seed. The seed-propagated 'Wave' series was also introduced and has similar characteristics, but a more restricted color range. Since then several series of great vegetatively propagated petunias have been released, expanding the range of growth habits, colors and degrees of doubleness offered.

The calibrachoa (*Calibrachoa* hybrids) is considered a new species in the floriculture trade, but actually has been in cultivation since the early 19th Century. A renewed focus on the *Calibrachoa* genus has resulted in the introduction of several new cultivar series in the last few years. *Calibrachoa* have a more limited color range than petunias but finer-textured foliage, a more pronounced trailing habit and abundant, small, single flowers.

Propagation

Our research goal was to develop high-quality, highly branched, compact vegetatively propagated petunia and calibrachoa plugs. A number of factors were examined that influence flowering and branching, including photoperiod, plug flat density, Florel application, light intensity, light quality and fertilizer rate. Petunia cultivars examined included 'Cascadia Charme', 'Cascadia Improved Charlie', 'Petunia Bright Dream', 'Doubleloon Blue Star', 'Marco Polo Odyssey' and 'Pocket Petunia'; calibrachoa tested included 'Lirica Shower Rose' and 'Colorburst Violet'.

HID lighting improved rooting during low-light times of the year, especially for slow-rooting cultivars such as Cascadia Charme, and will reduce time to transplanting by 7-10 days. Without HID lighting, cultivars that normally root rapidly will be ready to transplant in 10-14 days; slow-rooting cultivars will be ready to transplant in 17-24 days. Plugs grown under HID lighting and short days were the shortest. Light quality from either metal halide or high-pressure sodium lighting apparently had little effect, indicating that both types of lights are acceptable. Ambient lighting and long days increased plug height and final plant height for some cultivars. Long-day photoperiods increased plug height and final plant height for some cultivars and decreased final plant diameter for all cultivars. High-density (288) flats increased the percentage of cuttings lost to bacterial diseases and delayed flowering by an average of 2-4 days for all cultivars compared to low-density (105) flats.

Cuttings should be rooted at 70°F minimum temperature with bottom heat. Use propagation tents and avoid overmisting, which slows rooting and increases the likelihood of Botrytis and bacterial diseases. Some propagators recommend using rooting hormones with 2,500 IBA, especially on slow-to-root cultivars such as Cascadia Charme.

Flowering Control

Typical seed-propagated petunias are facultative long-day plants. Flowering will occur under LD or SD; however, plants will flower earlier with longer photoperiods and higher light intensities. Most vegetative petunias are also facultative long-day plants; however, a few cultivars act as short-day or day-neutral plants. Apparently, high light intensity can overcome photoperiodism, as some cultivars are long-day

plants under ambient light, but are day-neutral under HID lighting. All calibrachoa cultivars tested to date have been facultative long-day plants.

What does this mean for the grower? Long-day lighting should be given to both plugs during propagation and finished plants during the short-day time of the year, from October to March, to decrease time to flowering. Long-day lighting applied only during propagation may decrease crop time for photoperiod-responsive cultivars, such as Petunia Bright Dream, by up to two weeks. Generally, however, long-day lighting during propagation will decrease crop time by a week or less.

Production

Temperature. Grow at 60-65°F night temperature until rooted cuttings or plugs are established in the final container. Continue growing petunias at 60-65°F nights and 60-75°F days for most rapid growth; lower temperatures of 55-60°F can be used, but will slow growth. Calibrachoa can be grown at a wider temperature range from 50°F night to 85°F day.

Light. Grow plants under a minimum of 5,000-6,000 footcandles. HID lighting of 500 footcandles or more improves rooting during low-light periods, especially for slow-to-root cultivars. HID lighting can also increase the number of branches, but only for plants grown under long days.

Irrigation. While petunias and calibrachoa are drought-tolerant in the landscape, keep plants moist during production for optimum growth.

Nutrition. Both petunia and calibrachoa are considered to be relatively heavy feeders with recommended rates from suppliers of 250-350 ppm nitrogen for petunia and 200-300 ppm nitrogen for calibrachoa. However, we found that 150 ppm nitrogen was sufficient for good growth; higher fertilizer rates either had no effect or delayed flowering. Not surprisingly, however, foliage color was darker green for plants irrigated with 300 ppm nitrogen (bottom right). If lower fertilizer rates near 150 ppm nitrogen are used, plants can be greened up by using high rates for a couple of weeks just prior to shipping. Phosphorus rates should be 1/4-1/3 of nitrogen and potassium rates should be 2/3 of nitrogen. Calibrachoa and petunias have a high requirement for iron; be sure to incorporate additional iron into the nutritional program. Iron chelates can be used as sprays or drenches.

Growing Media. Petunia and calibrachoa are adaptable plants that thrive in a variety of commercial growing media. pH should be monitored and maintained at 5.5-6.0. Calibrachoa prefer low pH and can readily tolerate pHs lower than 5.5.

Growth Control

Both petunia and calibrachoa grow rapidly and can become leggy.

Environmental manipulation is the first control strategy to consider. Grow plants under high light, cool temperatures and zero to negative DIF to reduce stretch and promote rapid flowering. Pinching and pruning can also be used as needed to control growth (see Pinching section for details).

Many vegetative petunia cultivars are particularly vigorous and plant growth regulator (PGR) applications may be required. The general cultural information provided by the propagators list Bonzi and Sumagic as possible PGRs to apply, although no specific rates were provided. Dr. Terri Starman of Texas A&M University recommends Sumagic foliar sprays of 20 ppm in the "Tips on Regulating Growth of Floriculture Crops" guide. Researchers at Michigan State University conducted a number of PGR studies on vegetatively propagated plants. For vegetative petunias, they used A-Rest and Sumagic on 6-week-old plugs, while Bonzi, B-Nine and Cycocel were not used. They recommended a single spray application of A-Rest at 100 ppm or two spray applications of Sumagic, with the first at 20 ppm, followed by a single application two weeks later at 10 ppm. Please note that their recommended rates were based on a higher spray volume (1 gallon of spray applied over 150 sq. ft.) than the typical volume (1 gallon of spray applied over 200 sq. ft.) listed on most PGR labels.

Research at North Carolina State University also investigated the use of a wide range of PGR rates on the growth of Cascadia Improved Charlie vegetative petunia. The PGRs used included: A-Rest (60, 80, 100, 120 or 140 ppm), Bonzi (40, 60, 80, 100 or 120 ppm), Sumagic (5, 10, 20, 30 or 40 ppm) and a tank mix using a single rate of B-Nine (2,500 ppm) plus increasing rates of Bonzi (40, 60, 80, 100 or 120 ppm). The PGRs were applied 2 weeks after transplanting the cuttings into 6-inch pots. Flowering was not delayed by any of the PGR applications, with most plants flowering 71 days after transplanting.

A-Rest at spray rates less than 80 ppm were effective in producing plants that were 17 percent smaller in diameter than the untreated control. Only a single application was made and the residual effects appeared to wear off a few weeks prior to the time when data was taken. This would suggest that a second application at a lower rate may be beneficial.

Sumagic provided a greater degree of control than A-Rest. Rates of 5 and 10 ppm Sumagic were too low and did not provide sufficient control. Foliar spray rates of 20 ppm resulted in plants that were both 23 percent shorter and 20 percent smaller in diameter, as compared to the control. Plants were 34 percent shorter and 46 percent smaller in diameter when a 30 ppm spray was used. Sumagic rates between 20-30 ppm are recommended, depending on the degree of control desired.

Bonzi also worked well on vegetative petunia. Foliar spray rates of 40-60 ppm resulted in plants that were 23-29 percent shorter, respectively, than the control, and plant diameters that were 28-44 percent smaller.

Therefore, Bonzi rates of 40-60 ppm are recommended.

The tank mix of B-Nine at 2,500 ppm and Bonzi at 40-60 ppm was also effective. It resulted in plants that were 32 percent shorter and 45 percent smaller in diameter when compared to the control. The tank mix using Bonzi at 40 or 60 ppm did not provide a synergistic effect because the degree of control was similar as when only Bonzi was used. Greater synergistic effects occurred when B-Nine at 2,500 ppm was used with Bonzi rates less than or equal to 80 ppm (less than 55 percent smaller-diameter plants when compared to the control), but that degree of control might be considered excessive by many growers. Based on the similar results of Bonzi alone at 40 or 60 ppm or in combination with B-Nine, growers may find it easier to use only one chemical (Bonzi).

Please keep in mind that these recommended rates are based on North Carolina growing conditions. Growers in other locations will need to modify the rates, with growers in more northern locations using slightly lower rates, and more southern growers using slightly higher rates. All the foliar sprays were applied with a spray volume of 1 gallon over 200 sq. ft.

Spacing. With these rapidly growing crops, there is never enough space. Petunias in particular can easily intertwine, making shipping and marketing difficult. Watch the crop and apply growth retardants or cut back as needed to prevent tangled plants. Space plants as far apart as possible.

Pinching. Pinching is not required; however, pinching can be used on strongly trailing petunia cultivars to encourage axillary branching and bushier plants. Plants can be pruned and shaped at any time to reduce stretch and improve aesthetics; however, flowering or reflowering will be delayed by two or more weeks. Most of the propagators suggest pinching the plants when they are transplanted, and then repeatedly pinching at 3- to 4-week intervals as needed.

We found Florel at 500 ppm to be effective in increasing branching on some cultivars, but it greatly delayed flowering. A positive side effect of Florel use was that it decreased plant diameter for some cultivars. Unfortunately, for other cultivars the Florel-treated plants were larger at the time of flowering than the untreated plants because the delay in flowering allowed the plants to grow larger. If Florel is used as a substitute for pinching, apply a 500 ppm spray when the roots reach the edge of the pot.

Overgrown, lanky plants in the garden can be sheared back to allow for vigorous regrowth and renewed flowering later in the season.

Schedule/Timing. Considering the rapid growth of petunias and *calibrachoa*s, crop time can be short. Four to 6-inch pots of petunias will finish in 5-7 weeks without a pinch; add 2 or more weeks when pinching.

Use one rooted cutting per 4- to 6-inch pot; shorter crop time can be obtained with two cuttings per 6-inch pot.

Plant three to four cuttings per hanging basket, which will finish in 6-11 weeks. Late winter production will take 1-2 weeks longer than late spring due to lower temperatures and lower light levels. Calibrachoa will take 1-2 weeks longer than petunias.

Maintaining a healthy crop

Insects. Petunias and calibrachoa are more insect-resistant than many bedding plants, but whiteflies, thrips, aphids and fungus gnats can be a problem. Caterpillars can be particularly damaging in the spring when the vents are open or when plants are outdoors in the landscape. Overgrown plants in the retail setting or stock plants will be difficult to treat adequately.

Diseases. Botrytis is a common problem on open flowers and can quickly eliminate summer floral displays after a rain or periods of high humidity. Be sure to provide adequate air movement and keep humidity below 70 percent to reduce Botrytis. Powdery mildew and crown rot can also be problems.

Physiological Disorders. Chlorosis can occur with iron deficiency (low pH), nitrogen deficiency, root rot or low temperatures.

Postharvest. Petunia flowers are very sensitive to ethylene and exposure results in rapid wilting, but they will respond to 0.2-0.5 mM silver thiosulfate (STS) sprays, which is not labeled for use on petunias. EthylBloc is labeled for use on potted plants, but its efficacy on vegetatively propagated petunias and calibrachoa is not known.

Consumer Care

Both petunias and calibrachoa perform best in sunny locations and well-drained soil. As with most bedding species, regular watering and fertilizer applications produce superior results; however, unlike many bedding species, once plants are established, they can handle just about anything including heat and drought. Some of petunia cultivars, especially those with double or semi-double flowers can be sensitive to Botrytis in humid climates.

Most vegetatively propagated petunias and calibrachoa cultivars are cold-tolerant and can survive temperatures well below freezing. The calibrachoa is a perennial and is listed as hardy in Zones 9B-11, but can take temperatures down to 15°F in some cases. The cold hardiness allows consumers to plant petunias and calibrachoa early in the spring for quick color. In the fall, flowering tends to slow considerably and many

plantings maybe predominantly green.

Petunias and calibrachos tend to get overgrown and may look bedraggled by midseason. Rejuvenate established plantings in the garden by cutting them back hard, fertilizing and irrigating regularly if dry. Excessive growth in the garden can be prevented by first watering and fertilizing newly planted plants to allow them to root out into the soil and then cutting back on water and fertilizer to prevent excessive growth.

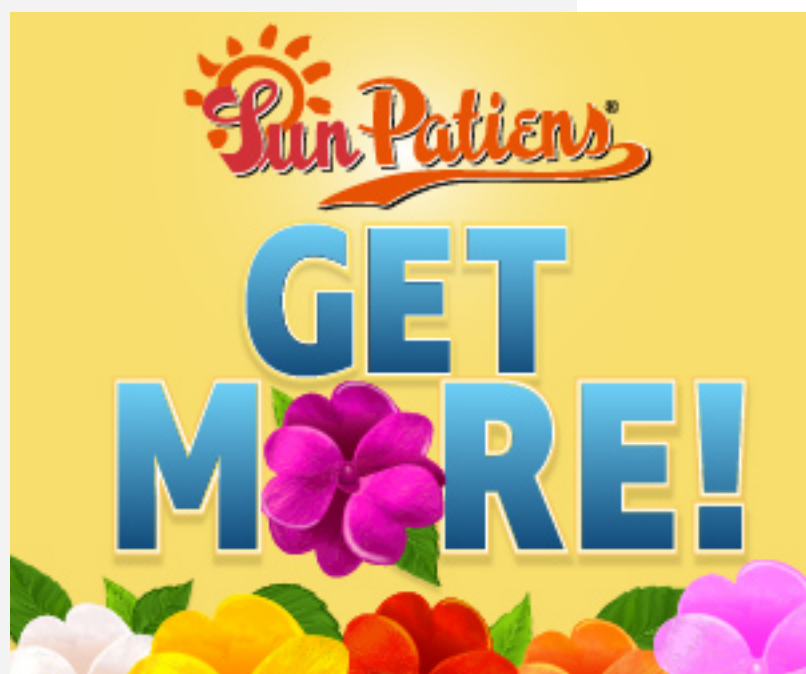
Petunias and calibrachoa make great container plants, producing cascades of color from hanging baskets, mixed containers and windowboxes. The frequent irrigation typically required by containers can rapidly leach them of nutrients, so be sure to keep plantings fertilized to prevent yellowing and lack of flowering. Petunias are heavy feeders and periodic fertilizer applications maintain lush growth.

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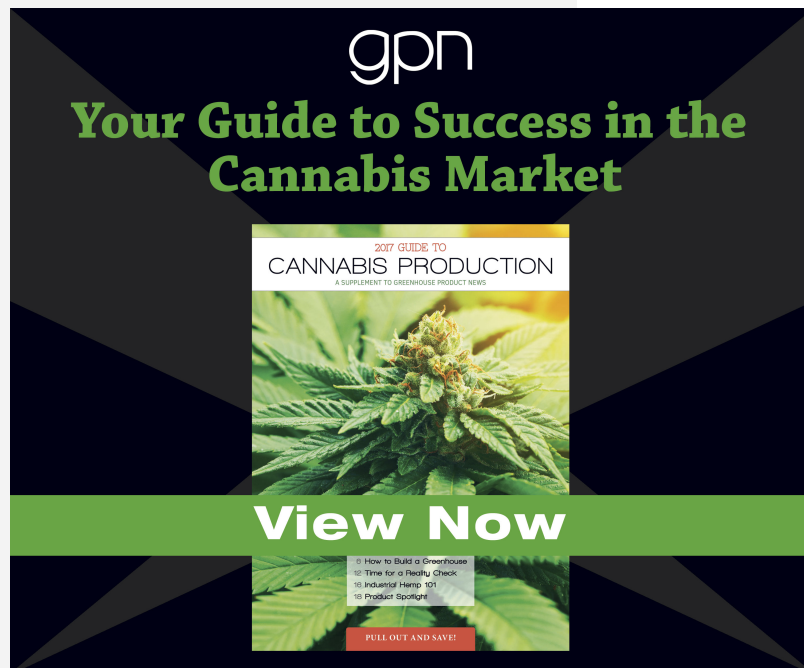
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