New Guinea Impatiens: Flowers On Time

New Guinea impatiens can be tricky to schedule for flowering on a particular day. These Michigan State University researchers unlock this plant's secrets.

Figure 1. A six-pack of four-inch pots ready for sale.

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NATIVE New Guineans have enjoyed the colorful flowers and foliage of New Guinea impatiens for centuries. Known to western botanists since 1884, the first commercial New Guinea impatiens varieties were introduced in 1972, and their popularity with Western gardeners has been growing ever since.

Consumers often view New Guinea impatiens as a premium product – an affordable luxury with an upscale, exotic appeal. These unique-looking plants thrive in partly sunny sites. Many plants are marketed in hanging baskets and four-inch or larger pots, but some are produced in flats and packs (Figure 1).

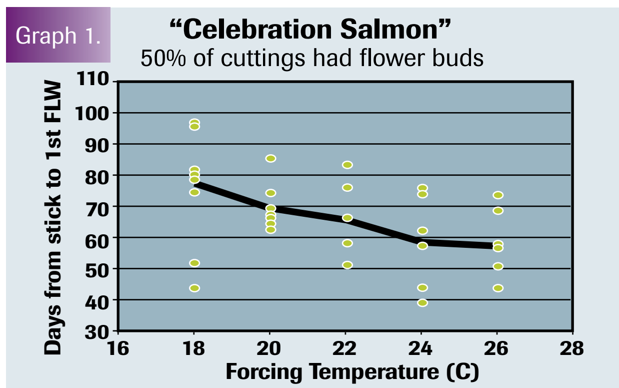
There are several theories explaining the different flowering responses of New Guinea impatiens that growers encounter. We've tested these plants during the last three years to better understand their flowering physiology and culture, and provide information about their timed flowering.

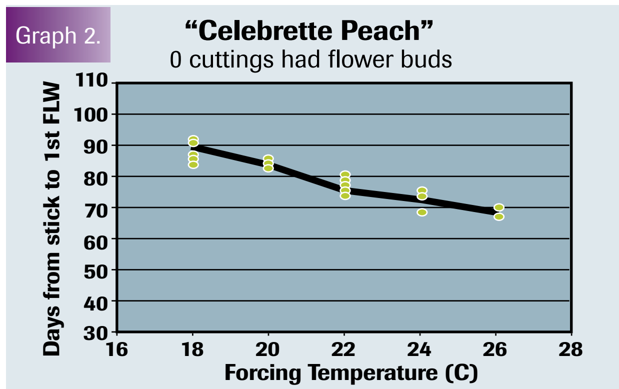
Flowering

The key to flowering New Guinea impatiens is understanding it's a day-neutral plant, and vegetative shoots will usually produce flowers as they grow. It's difficult to keep a New Guinea impatiens plant in a vegetative state.

Newly developing lateral shoots will almost immediately become reproductive, and cuttings from a stock plant will likely be reproductive. How far the plant has developed toward flowering when the cutting is taken depends on how old the lateral shoot is and how long it has been since the stock plant was treated to drop flowers.

Growers who buy in cuttings or propagate their own have probably noticed some cuttings have flower buds, while others don't. This can cause growers several problems. First, flower bud development in cuttings is generally not uniform, therefore open flowers can appear at





Graphs 1 and 2. Time to first flower at five different forcing temperatures in two cultivars. Each dot represents the date the first flower opened on one plant. For 'Celebration Salmon,' 50% of the cuttings had flower buds when they arrived while none of the cuttings were reproductive in 'Celebrette Peach.' Note the different patterns of flowering in plants grown from these cuttings. Flowering was nonuniform in 'Celebration Salmon.' For example, a few plants flowered 40 to 50 days after sticking at 63°F (18°C), while others took nearly 100 days. The early flowers appeared on cuttings that had flower buds when they arrived. Flowering was much more uniform in 'Celebrette Peach' because cuttings were uniformly vegetative when propagated.

Figure 2. New Guinea impatiens cuttings should be vegetative to avoid premature flowering during and following propagation. Here, plants are about three weeks old from the start of propagation.

any time, even during rooting. These flowers often become infected with Botrytis as they fall on the leaves or on a crop below if grown in baskets. Second, early flowers often develop below the leaves and don't add to the appeal of the plant. Third, cuttings often have flower buds in various stages of development, thus flowering isn't uniform, blocking bench-run shipping. Finally, cuttings can be at any developmental stage – from totally vegetative to almost flowering – making it difficult to predict the crop's finishing date.

For our study, we dissected commercially-grown, unrooted cuttings. Between zero and 100% of the cuttings received on a particular date had flower buds, varying by cultivar. We also found that a cultivar having all reproductive cuttings in one shipment might have no reproductive cuttings in the next shipment. Further, the flower buds' developmental stages within a shipment varied greatly, resulting in nonuniform flowering for that batch (Graphs 1 and 2).

This is the main reason growers see variability in New Guinea impatiens flowering between different seasons, pot sizes, cultivars, and years. Our data shows that many factors flowering variability has been attributed to – such as pot size, nutrition, and root-bound status – are not important.

New Guinea impatiens flowering occurs from Stages 0 to 1. At Stage 0, the cutting is vegetative, and when it reaches Stage 1, the flower opens. Because cuttings from stock plants can be anywhere from Stage 0 to 1 (Figure 2), it's easy to see why problems occur when timing a crop.

Although the total time from sticking reproductive cuttings to flowering increases when they are reset to Stage 0, a cutting at Stage 0 can be timed to flower on a particular date in the future. To remove flower buds and reset a cutting to Stage 0, we suggest applying Florel to the cuttings within one to two days after sticking. A concentration of 250 ppm should be adequate to abort flowers for most cultivars. Some will require higher rates to abort all flowers.

Some leaf curling occurred in a few varieties when they were sprayed with Florel on the day our cuttings were stuck. The leaves did recover from the damage and subsequent development was normal. New Guinea impatiens cuttings suffer from severe leaf-petiole curling within a day of being stuck. This may be a result of ethylene exposure during shipping and/or recent Florel application on the stock plant, causing ethylene release in the cuttings during shipment.

It's critical to apply Florel only once immediately after sticking the cuttings, for the quickest time to flower. Treating with Florel resets the plants to Stage 0 each time it's applied. Applying Florel later on will further delay flowering (Figure 3).

Propagation

Most cultivars are patent protected, so growers must either purchase rooted or unrooted cuttings, or sign propagation license agreements. Unrooted cuttings root easily in a standard medium with mist and bottom heat. Maintain root-zone temperatures between 72°F and 79°F (22°C and 26°C). Under these conditions, plants should be well rooted and ready for transplanting three weeks after sticking if propagated in plug trays. They can be held longer in the plug tray if rooted in larger cells such as 50-cell trays. Crowding cuttings will cause shoots to stretch and flowering may be delayed (Figure 4).

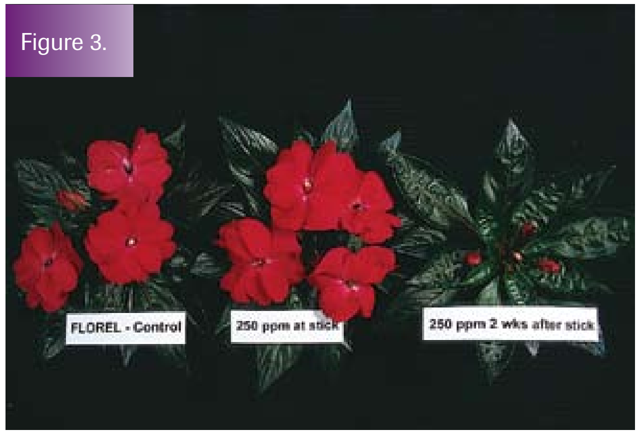


Figure 3. Effect of Florel spray on subsequent flowering. Florel usually does not delay flowering of vegetative cuttings if applied to cuttings at the time of sticking, but if applied later, flowering will be delayed.

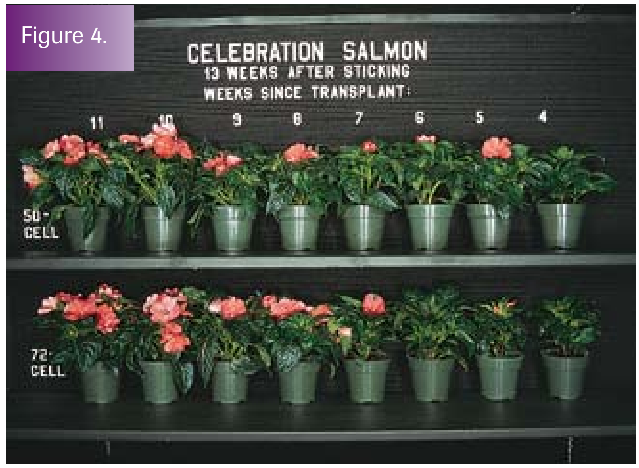


Figure 4. Holding plugs in trays for long periods can delay their flowering. From left to right, these plants were transplanted two to nine weeks after sticking in 50- or 72-cell plug trays. Flowering was increasingly delayed as time in the plug tray increased. Flowering was delayed more as plant density increased.

Temperature

New Guinea impatiens prefer moist, moderately warm conditions. When we forced plants at temperatures between 57°F and 84°F (14°C and 29°C), plant appearance was best at 73°F

Figure 5.

Figure 5. Effect of forcing temperature on New Guinea impatiens. Plants forced at 73°F (23°C) flowered rapidly and were very attractive.

(23°C) (Figure 5). Leaf and flower size decreased dramatically and many flower buds aborted at temperatures above 79°F (26°C) (Figure 6). Plant development is very slow when temperatures average less than 63°F (17°C).

Plant temperature, not greenhouse temperature, is what controls plant growth. In our experiments we used sensors to monitor plant temperature, and noticed that the temperature of New Guinea impatiens plants, especially at night, was often well below air temperature. In one experiment with high night temperatures, plant temperature was as much as 18°F (10°C) below air temperature.

Why were the plants so cool? New Guinea impatiens use large amounts of water and are not drought tolerant. Their leaves, especially young leaves, have a low resistance to water loss, so they easily lose water through evaporation, cooling leaves and shoot tips. The drier the greenhouse air or the lower the relative humidity, the more quickly water evaporates from the plants, caus-

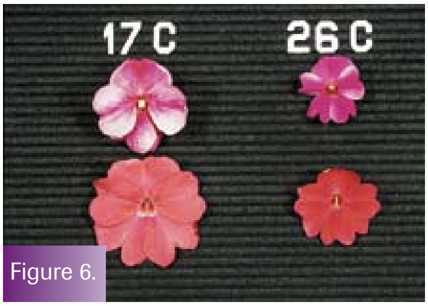


Figure 6.

Figure 6. Flower size tends to decrease as forcing temperature increases. Although flowers were quite large at 63°F (17°C) compared to those at 79°F (26°C), plants developed very slowly. Top cultivar, 'Paradise Guadeloupe,' bottom cultivar, 'Celebration Rose.'

ing them to become cooler. Even when air temperature is maintained at 73°F, plants will be much cooler under low humidity conditions common in glass greenhouses in midwinter. This results in slower than expected plant development and flowering.

We injected water vapor into our greenhouses to maintain a higher humidity, reducing transpiration. Our study shows humidity should be no lower than 75%, especially at night, to obtain plant temperatures within two to three degrees of the air temperature. Daytime humidification is less important, except on very cold and cloudy days, because plants are warmed by sunlight.

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>
> *MSU researchers*

Light Intensity And Photoperiod

Flowering in New Guinea impatiens is not controlled by daylength. They grow best under moderate light levels of 3,000 to 4,000 footcandles, and will need shade if light levels are consistently above 5,000 footcandles. The total amount of light a plant receives during a day, called the daily light integral (DLI), is a major factor determining how many flowers a plant forms. Plants grown under a higher DLI have more flowers (Figure 7). Supplemental light increases the number of flowers per node during low light winter days.

Light intensity doesn't influence time to flower directly, but does indirectly because plant temperature in high light situations is generally greater than under low light conditions. Plant temperature controls the plant's growth rate, therefore plants forced under higher light levels often flower more quickly than those forced under low light conditions.

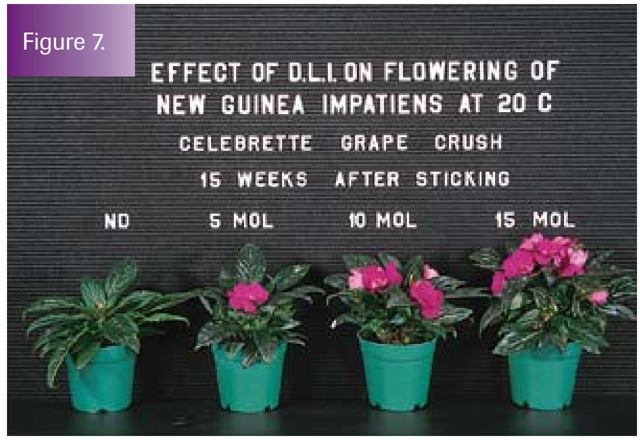

Figure 7. The total amount of light a plant receives during a day, called the daily light integral (DLI), influences how many flowers will form on a plant. Plants grown under higher light have more flowers. In this case, they also flowered earlier because the supplemental light used to increase the DLI also warmed the plants. At the same plant temperature, we have not observed that light intensity affects time to flower.

Media And Containers

We recommend fast-draining media with good water retention to minimize root rot problems. We found no evidence that container size (small to large) affects time to flower, but flowering may be delayed if young plants are stressed by crowded conditions in plug trays.

Watering And Nutrition

Plants have large water requirements once they approach saleable size, but they can be overwatered when small. Severe wilting causes plants to drop flowers and abort young flower buds. Maintain media pH between 5.8 and 6.2. New Guinea impatiens can be sensitive to micronutrient toxicities if pH drops below 5.8.

New Guinea impatiens don't need heavy feeding and are susceptible to high soluble salt injury, so fertilize moderately. If there is a pre-plant fertilizer charge in the soil, don't apply fertilizer for the first two to three weeks after transplanting, or until roots reach the pot's side. If there isn't a pre-plant charge, then fertilize at 100 ppm nitrogen starting with the first irrigation. Nitrogen levels of 100 to 150 ppm in a constant liquid fertilization program are generally sufficient for New Guinea impatiens.

Height Control

Height control requirements primarily depend on cultivar and container size. New Guinea impatiens will stretch if crowded, so spacing appropriately and providing adequate light levels are important. They also respond to positive DIF by stretching and negative DIF by remaining compact.

Response to growth regulators varies widely between varieties, even within a series. Some varieties don't require growth regulators, while others will soon outgrow four-inch pots without a growth retardant application.

We found Sumagic to be highly effective, and it works very well at the correct rate. Sort cultivars according to growth habit, and apply 0.5 to one ppm Sumagic to the more vigorous varieties, if necessary. A repeat application of one ppm is better than a two ppm application that might stunt growth. Less vigorous cultivars shouldn't receive Sumagic, at least in cooler climates (Figures 8 and 9). A-Rest at 25 to 50 ppm is effective on some cultivars. We suggest growers learn their cultivars' growth habits and the responses to growth regulators by starting at low rates and increasing concentration as necessary.

Diseases, Insects, And Related Pests

New Guinea impatiens are susceptible to root and stem rots caused by Pythium, Phytophthora, and Rhizoctonia. Foliage can become infected with Myrothecium leaf spot, and Botrytis attacks flowers, leaves, and stems. Using appropriate growing media, sanitation, and watering practices help minimize disease problems.

In our study, increasing nighttime greenhouse humidity to increase plant temperature (see Temperature section, page 52) didn't increase our disease problems during midwinter, but actually reduced them. Plants raised under higher humidity needed watering less often, resulting in less water on the foliage and crown, and less disease.

The viral diseases impatiens necrotic spot virus (INSV) and tomato spotted wilt virus (TSWV) will infect New Guinea impatiens, and no chemical controls are available. Symptoms include black spots or lesions on the stem or leaves, stunting, distorted growth, and total plant collapse. The only ways to control these serious diseases are to use clean starting material, rogue infected plants, and stop the primary vector – Western flower thrips. These viruses have an extensive host range, so many plants in and around the greenhouse can serve as an infection source.

Western flower thrips damage New Guinea impatiens foliage and flowers directly, causing scarring and deformation. Their main threat, however, is as INSV and TSWV transmitters. Thrips must feed on infected plant tissues as larvae to acquire the virus, and then become carriers for the rest of their lives. Monitor thrips populations closely

Figure 8.

Figure 9.

Figures 8 and 9. Sumagic is very effective for height control of New Guinea impatiens. Cultivars differ in their response – even two ppm was excessive for compact varieties like 'Celebrette Cherry' but worked well for 'Celebration Rose' in this experiment.

and control them with a thorough spray program. Like the viruses they carry, thrips have an extensive host range and will feed on many species of plants.

Aphids, fungus gnats, shore flies, and two-spotted spider mites also can infest New Guinea impatiens. Use appropriate sanitation and chemical controls as needed.

Scheduling

The time from sticking to flower depends on forcing temperature and cultivar. Compact cultivars with smaller flowers tend to bloom more quickly than taller plants with large flowers. In a trial of 105 cultivars, time from sticking a cutting (reset to Stage 0 with Florel) to the third open flower ranged from 12 to 14 weeks at 68°F (20°C) (see GG February 2000, page 104). Plants flower about one week faster (11 to 13 weeks) at 73°F (23°C) but two weeks later (14 to 16 weeks) at 62°F (16°C). Time from visible bud to the first flower's opening was about four weeks at 68°F (20°C), three to four weeks at 73°F (23°C), and about five weeks at 63°F (17°C). **GG**

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