

Greenhouse Production of Impatiens

Profuse flowering under shady conditions and low maintenance have made Impatiens the best-selling spring bedding plant. Hundreds of cultivars are available with flowers in nearly every color of the rainbow and growth habits suitable for many landscape and container applications.

The most widely grown Impatiens for greenhouse production can be classified into two broad categories. In the first category are seed-propagated Impatiens (*Impatiens wallerana*) which are produced following standard bedding plant practices. Seeds are sown in plug flats and then transplanted to market packs for sale when flowers open. Cultivars in this category generally have compact growth, are self-branching (and therefore require no pinching), produce numerous flowers, and perform best under lower light intensity.

All single-flowered cultivars of seed Impatiens are F₁ hybrids, while double-flowered cultivars can be propagated from either seed or cuttings. Nearly every seed company has developed its own breeding series. Some major breeding series include the Dazzler series, which are



large plants especially adaptable to landscape use; the Super Elfin series, which has a spreading, compact habit of growth; and the Accent series, which has a wide range of flower colors.

In the second category are New Guinea Impatiens (*Impatiens x hybrida*). These plants have only recently become popular since their introduction to the U.S. market in 1972. New Guinea Impatiens are generally larger plants with larger flowers that can tolerate higher light levels than seed Impatiens can. Most are grown commercially in hanging baskets or as potted plants for transplanting into the landscape or as container plants for the patio or window boxes.

These plants are typically too large for all but the largest market packs.

Since the introduction of New Guinea Impatiens, numerous breeding series comprised of about a hundred cultivars have been released. The majority of New Guinea Impatiens cultivars are currently propagated vegetatively, although seed-propagated cultivars have recently been introduced to the market. Most of the vegetatively propagated cultivars are patented, so growers should not take cuttings unless they have a propagator's license.

Seed Impatiens

For the best results in starting Impatiens seed, purchase fresh F₁ hybrid seeds each season from a reputable supplier. In planning the number of seed to order for production, consider that there are 35,000 to 60,000 seed per ounce, depending on the cultivar. If seeds must be kept from one season to the next, store them in a dark, cool, dry environment away from insects and rodents. As a general rule, store seeds under conditions where the sum of the Fahrenheit temperature and percent relative humidity does not exceed 100. For example, where seeds are stored at 45 degrees F, the humidity should not exceed 55 percent. Seeds that are sealed in containers containing a desiccant material can be stored in a refrigerator designated for seed storage.

Seed Germination

Growers pay a premium price for high-quality Impatiens seeds. Therefore, care and planning are necessary to ensure that the maximum number of transplantable seedlings will be produced from an ounce of seed. The most effective way to sow seeds is using an automatic seeder. The 406 plug flat is often used because it is small enough for economic production while providing enough space for growth until transplant. However, larger plug sizes can be used to meet special production goals.

Sow seeds in plug flats containing a moist, well-drained, sterile medium such as one of the many peat-lite

mixes available commercially for plug culture. Medium pH should be 5.5 to 6.0. A pH below 5.0 inhibits germination by as much as 60 percent. The medium soluble salts should be in the range of 0.75 to 1.25 mmhos/cm based on the saturated paste extraction method. Sow seeds directly on the medium surface, and cover the seeds with a thin layer of vermiculite (#3, fine grade). The thin layer of vermiculite allows the light some Impatiens seed needs to germinate to reach the seeds while maintaining adequate moisture around the seed.

Temperature is critical for rapid, uniform seed germination. Maintain a medium temperature of 72° to 75°F for the first 7 to 10 days or until radicals emerge, then 68° to 72°F night and 70° to 75°F day temperatures for seedling growth. Germination temperatures that are too high or too low can reduce germination rate. Water temperatures for irrigation and mist should be 70° to 78°F to ensure that medium temperatures are high enough during germination. Night temperature can be lowered to 60° to 62°F in the last week of plug production to tone the seedlings and prepare them for shipping and transplanting.

Impatiens seeds require close to 100 percent relative humidity for rapid, uniform germination. To maintain high relative humidity, cover plug trays with clear polyethylene. Support the plastic above the trays to prevent the seedlings from sticking to the condensate that collects on the inside

of the plastic covering. However, be careful to prevent the temperature from getting too high under the plastic on warm, bright days. Remove the plastic and reduce humidity after germination to permit gas exchange and encourage the radical to penetrate the medium. Do not allow the medium to dry out during germination, but once the plants develop true leaves, some drying between watering helps prevent disease problems.

A one-time application of a calcium-based fertilizer, such as calcium nitrate, at a rate of 25 to 50 parts per million (ppm) nitrogen has been found to enhance germination when applied 2 to 3 days after seeding. Thereafter, apply a low-ammonium fertilizer at a rate of 100 to 150 ppm nitrogen once a week beginning when cotyledons unfold. Raise this rate to 150 ppm nitrogen applied twice a week when true leaves develop.

Transplant the seedlings from plug flats when leaves of adjacent seedlings begin to touch and root development is sufficient to remove the soil ball as a whole unit. Generally, three to four mature leaves will be present at the correct transplant stage. Water seedlings thoroughly immediately after transplanting. Seed Impatiens are typically transplanted to 36- or 48-celled market packs. However, plants perform equally well in 3½-inch and larger pots, in combination pots with other annuals, and in hanging baskets.

Table 1. Foliar Nutrient Ranges for Seed Impatiens

Element	percentage	Element	ppm
N	3.6 to 5.8	B	23 to 25
P	0.8 to 0.9	Cu	20 to 37
K	1.4 to 2.4	Fe	107 to 130
Ca	1.8 to 2.4	Mn	329 to 419
Mg	0.9 to 3.6	Zn	57 to 67
S	0.8 to 0.9	Mo	0.3 to 0.9

Source: Plant Analysis Handbook II, MicroMacro Publishing, 1996.

Growing-On

Growing Medium

A light, well-drained, peat-lite medium with high water- and nutrient-holding capacity is desirable. Medium pH should be 5.5 to 6.0, with a soluble salts of 1.25 to 2.00 mmhos/cm based on the saturated paste extraction method.

Temperature

After transplanting, grow seed Impatiens at 62° to 65°F night and 70° to 75°F day temperatures. Use 65°F night temperatures for a week or so after transplanting for rapid root development, and then drop to 62°F if desired. Lower temperatures delay growth and flowering. Temperatures above 80°F cause stem stretching and leaf damage, especially at high light intensities.

Light

No shading of the greenhouse glazing is necessary during the winter and early spring. However, greenhouse shading is needed as the season progresses.

Fertilization

The fertility program should be adjusted according to the medium used, environmental conditions, watering practices, and stage of production. Start by applying a balanced liquid fertilizer such as 15-15-15 at a rate of 100 to 150 ppm nitrogen every second or third watering. Adjust the fertilizer rate according to soil tests and foliar analysis. Table 1 lists foliar nutrient ranges for seed Impatiens.

Growth Retardant

One application of B-Nine at a rate of 5,000 ppm, Bonzi at 6 to 25 ppm, or Sumagic at 5 to 10 ppm (2 quarts per 100 square feet) may be necessary in the South to keep plants compact when night temperatures are elevated. Test growth retardants on a small number of flats under existing growing conditions before applying them to the entire crop.

Scheduling

Seed Impatiens require 4 to 6 weeks in plug flats, depending on the cultivar, growing conditions, and cultural practices, followed by 4 to 6 weeks in market packs.

Common Problems

Physiological

Low light, high fertility, high temperature, and over-watering can result in stretching, excess foliage, and poor flowering. Water stress causes leaves to yellow and fall off. Impatiens are very sensitive to ethylene, which can cause flower abortion, leaf abscission, and foliage damage.

Pests

The most common insects and related pests of Impatiens are aphids, thrips, mealy bugs, and spider mites.

Diseases

Botrytis is a problem under cool, moist conditions. *Rhizoctonia* and *Pythium* can cause damping-off of seedlings.

New Guinea Impatiens

Propagation

Growers may start a New Guinea Impatiens crop in one of three ways: (1) order a cutting to grow stock plants from which cuttings are taken and rooted in-house for production, (2) order unrooted cuttings to root in-house for production, or (3) order rooted cuttings which are transplanted to the finishing container. The third method is preferred by many small growers and those with limited propagation facilities. It is essential to order the high-quality, certified, disease-free propagation material from specialized propagators. New Guinea Impatiens can suffer from tomato spotted wilt virus

(TSWV) and Impatiens necrotic spot virus (INSV).

Everything associated with propagation should be sanitized. Use sterile medium, clean (new) flats, and sterilized bench tops. Sterilize anything that comes in contact with the cuttings. Sanitize equipment by soaking it in a 10 percent hospital disinfectant solution for 60 minutes or in a 10 percent household bleach solution for 30 minutes.

Many different kinds of propagation media have been used, including peat-lite media, vermiculite, perlite, or rockwool, but all must be well drained and exceptionally well aerated. The propagation medium pH should be in the range of 5.5 to 6.5, with low soluble salts (less than 0.75 mmhos/cm based on the saturated paste extraction method). Light levels in the propagation area should be 2,000 footcandles.

A 3/4- to 1-inch tip cutting with no more than 2 fully expanded leaves is the best material to propagate. Remove lower leaves so that 3/8 to 1/2 inch of the stem base is inserted into the propagation medium. Root cuttings at 70° to 72°F night and 75°F day temperatures, preferably with bottom heat at 72° to 75°F to warm the propagation medium. Place cuttings under mist, with mist intervals ranging from every 15 minutes on sunny days to every 2 hours on cloudy days for 5 seconds, depending on the environmental conditions. Mist at night is usually not required and may be harmful.

Cuttings should form callus at the stem base in 5 to 7 days and 1/4-inch roots in 10 to 14 days. Reduce the mist interval to about every 1/2 hour at this stage. Root development is usually adequate for transplanting in 3 to 4 weeks. Fertilizer or growth retardants are not generally needed in propagation. Transplant as soon as the cuttings are well rooted to prevent stretching. Water seedlings thoroughly and immediately after transplanting. Newly potted cuttings can be maintained pot-to-pot until the canopies begin to close, and then the containers can be placed at final spacing.

The mainstay of New Guinea Impatiens production for most growers is the 4- or 4 1/2-inch pot with one rooted

cutting per pot, although 5- or 6-inch pots may be produced, depending on market demand. Five-inch pots may have one or two cuttings per pot and 6-inch pots one to three cuttings per pot. The choice of cutting number per pot depends on cutting costs versus production timing. New Guinea Impatiens may also be grown in jumbo market packs or 3- to 3 1/2-inch pots for the mass market. Hanging baskets of New Guinea Impatiens are also popular, with one to three cuttings per 8-inch basket, one to four cuttings per 10-inch basket, or three to five cuttings per 12-inch basket. Table 2 contains a summary of cutting number per container and container spacing.

Table 2. Product Types and Scheduling of New Guinea Impatiens

Container size (inches)	Cutting number	Spacing (inches)	Weeks to finish
4	1	7 x 7	6 to 8
5	1 to 2	8 x 8	7 to 9
6	1 to 3	10 x 10	8 to 10
8	1 to 3	14 x 14	8 to 10
10	1 to 4	18 x 18	12 to 14
12	3 to 5	20 x 20	12 to 14

Source: D.A. Bailey, 1995, North Carolina Cooperative Extension Service, Leaflet 526.

Growing-On

Growing Medium

Use a peat-lite medium composed of peat and perlite, vermiculite, composted bark, or rockwool. The medium should be well drained and well aerated but with slightly more water-holding capacity than for many crops. New Guinea Impatiens generally require a lot of water and should never wilt. Extra water-holding capacity facilitates this goal, especially in hanging baskets. Use sufficient dolomitic lime to bring the medium to a pH of 5.8 to 6.2. Add the lime, superphosphate (4½ pounds per cubic yard), and micronutrients (½ to ¾ manufacturer-recommended rate) to the medium at mixing. Medium pH should not drop below 5.8, especially if manganese and iron concentrations are above a range of 3.0 to 5.0 ppm, because New Guinea Impatiens are sensitive to micronutrient toxicity.

Fertilization

Little or no fertilization is required until the roots of plants in the final container reach the pot margins, usually in 2 weeks. Fertilize on a constant liquid-feed program at 100 to 150 ppm nitrogen, with the nitrogen level about equal to potassium (100N-0P-100K to 150N-0P-150K ppm). Little or no phosphate is needed if superphosphate was added during mixing of the medium. If superphosphate was not added to the medium, liquid-feed with 50 to 75 ppm phosphorus. If fertilizer is not applied at every watering, use 300 to 350 ppm nitrogen and potassium and 100 ppm phosphorus every third watering. Be careful using a fertilizer containing micronutrients, particularly if micronutrients were added during mixing of the medium. Micronutrient toxicity symptoms can cause necrosis of lower leaves or leaf margins, shoot die-back, or distorted, stunted upper

leaves. Magnesium deficiency is common and may be corrected by drenching with 8 ounces magnesium sulfate per 100 gallons of water once per month. Recommended saturated paste media standards and foliar analysis ranges are listed in Tables 3 and 4, respectively.

Temperature

Proper plant development of New Guinea Impatiens requires relatively warm temperatures. Maintain the night temperature at 68°F and day temperature at 75°F for the first 2 to 3 weeks. After adequate root development, reduce the night temperature to 65°F. Night temperatures above 72°F can delay flowering.

Light

New Guinea Impatiens tolerate higher light intensities than do seed Impatiens. Provide as much light as possible in the winter and spring. Provide a minimum light intensity of 3,000 to 4,000 footcandles during the middle of the day. Low light reduces variegation in the foliage and slows flowering. Apply shade to the greenhouse glazing to avoid sunburn to foliage if light intensity exceeds 6,000 footcandles.

Table 3. Media Saturated Paste Standards¹ for New Guinea Impatiens

pH	5.8 to 6.2	Mg	30 to 70
EC ₂	1.5 to 2.25	Na	0 to 20
N-NO ₃	75 to 125	Fe	0.3 to 3.0
N-NH ₄	0 to 10	Mn	0.02 to 3.0
P	5 to 10	Zn	0.3 to 3.0
K	75 to 125	B	0.05 to 0.5
Ca	100 to 200		

¹Elements in parts per million

²Electrical conductivity in mmhos/cm using saturated paste extraction

Source: D.A. Bailey, 1995, North Carolina Cooperative Extension Service, Leaflet 526.

Table 4. Normal Foliar Analysis Ranges for New Guinea Impatiens

Element	percentage	Element	ppm
N	2.0 to 4.5	Fe	75 to 300
P	0.2 to 0.8	Mn	50 to 250
K	1.5 to 4.57	Zn	25 to 100
Ca	0.5 to 2.0	Cu	5 to 15
Mg	0.3 to 0.8	B	20 to 60
S	0.1 to 0.8	Mo	0.2 to 1.0

Source: Plant Analysis Handbook II, MicroMacro Publishing, 1996.

Pinching

Newer cultivars are self-branching and require no pinching. Pinching will delay flowering by 2 to 3 weeks.

Growth Retardants

Height control is generally not required for New Guinea Impatiens as long as high light levels, adequate plant spacing, and proper fertilization and watering practices are maintained. Many of the newer cultivars have compact growth habit and do not require chemical height control. For cultivars that do stretch, apply a foliar spray of Bonzi at a rate of 5 to 30 ppm (2 quarts per 100 square feet).

Scheduling

The timing of New Guinea Impatiens crops depends on several factors including cultivar, environmental conditions, pot size, number of cuttings per pot, and cultural practices. Growers should keep detailed

records of crop performance and timing to improve future scheduling efforts. Use Table 2 as a scheduling guide.

Common Problems

Physiological

Low light and low fertility can cause mottled foliage. Water stress causes leaf and flower bud abscission.

Pests

Common insects and related pests of New Guinea Impatiens are spider mites, cyclamen mites, thrips, mealybugs, and aphids.

Diseases

Pythium and *Phytophthora* cause root rots. *Rhizoctonia* causes stem rots. Impatiens necrotic spot virus (INSV), which is carried by thrips, can be a serious problem. *Botrytis* can be a problem under cool, humid conditions.

Specific control measures for insect and disease problems can be found in Extension publication ANR-500, *Alabama Pest Management Handbook*. For more information, contact your county Extension agent.

Additional Reading

Banner, W. and M. Klopmeier, eds. 1995. *New Guinea Impatiens: a Ball guide*. Ball Publishing, Batavia, IL.



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For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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