

GREENHOUSE CULTURE
AmeriHybrid® Begonias
FROM TUBERS

PLANTING:

For best results, germinate tubers in a 72° F. environment in moist, not wet soil until the first leaves appear. Then begin regular watering. Use one of the following methods when starting tubers.

Option #1: Plant directly into the final container. Place bulbs concave side up. Cover with $\frac{1}{2}$ " potting soil.

Option#2: Save greenhouse space by planting in propagating flats. Cover with $\frac{1}{2}$ " potting soil. When tubers have sprouted and the first leaves are present, transplant into containers. When using multiple tubers per pot, take care to sort similar size plants per pot. This will help finish some pots earlier and also adds uniformity. A small pot or liner may also be used for starting tubers.

This transplant approach also allows one to orient the tubers in the pot making sure which way most of the blooms will face. Begonia blooms orient outwards from between leaf tips. So, especially with all multiple tubers per pot, as in hanging varieties, point leaves away from pot center. Pot symmetry is assured with this technique.

CONTAINERS:

Best performance is achieved when a relatively large pot is used. Good root systems will form and frequent drying of the medium will be avoided.

CONTAINER SIZES	<u>SIZE TUBERS PER POT</u>	
	<u>Hanging Basket</u>	<u>Upright</u>
4" (10 cm)	Not recommended	one: 1 $\frac{1}{2}$ " OR one: 1 $\frac{1}{4}$ "* OR one: 1"
<i>4" pot size suitable for Picotee 'On Top' varieties only</i>		
6"(15 cm)	one: 1 $\frac{1}{2}$ "* OR two: 1 $\frac{1}{4}$ "	one: 1 $\frac{3}{4}$ " OR one: 1 $\frac{1}{2}$ "*OR one: 1 $\frac{1}{4}$ "
8" (20 cm)	three: 1 $\frac{1}{4}$ "* OR two: 1 $\frac{1}{2}$ " OR one: 2" OR one: 2 $\frac{1}{2}$ "*	one: 2 $\frac{1}{2}$ " OR one: 2"* OR one: 1 $\frac{3}{4}$ " OR one: 1 $\frac{1}{2}$ "
10" (23 cm)	three: 1 $\frac{1}{4}$ " OR three: 1 $\frac{1}{2}$ "* OR 1 $\frac{3}{4}$ " two: 2"	one: 2 $\frac{1}{2}$ "* OR one: 2"
12" (28 cm)	four: 1 $\frac{1}{4}$ " OR three: 1 $\frac{1}{2}$ " OR 1 $\frac{3}{4}$ " three: 2"* OR two: 2 $\frac{1}{2}$ "	one: 2 $\frac{1}{2}$ "

*Best Combination

As a rule of thumb for uprights, choose a pot about four times the diameter of the tuber.

PLANTING MEDIUM:

Potting medium should be friable and porous. It should hold moisture yet drain well. A pH of 6 to 6.5 is best. Saturated media short on air space will favor pathogens. Most commercial mixes, except for the truly lean ones, will work. 2 parts coarse peat, 1 part coarse vermiculite and 1 part coarse perlite will also work well. Mixes with native soils are not recommended.

FERTILIZER:

Tuberous begonias are rather heavy feeders. Use a water soluble (complete or 20-10-20 with micronutrients) fertilizer. Begonias require nitrogen to keep good lush green color; If constant feeding with each irrigation, use a 20-10-20 at 50 to 100 ppm nitrogen. If fertilizing only once per week, use 20-10-20 with micros at 100-150 ppm nitrogen. Best results are achieved when lower nitrogen levels are used during early growth. Likewise Hi-Bloom fertilizers can help control plant size and induce early flowering. Increase nitrogen levels once blooming. Be sure to not allow salts to build up in the soil by leaching with clear water periodically.

WATER:

Begonias prefer moist, but not wet, conditions. Water on demand (early in the day if possible), allowing media surface to dry out only occasionally. Avoid watering the foliage. Late irrigations coupled with cool nights favor both mildew and botrytis.

ENVIRONMENT:

Natural Light: Begonias do not like full sun. Between 2,000 and 2,500 foot candles is best, however begonias will tolerate much higher light levels if exposed to them from the time of planting and grown below 70° F. However, moving foliated plants from lower to higher light conditions will likely result in burned leaves. Except in highly overcast situations, begonias often require 50% to 65% shade.

Supplemental Lighting: Tuberous begonias naturally grow and flower under the long days of summer and early fall. Forcing begonias to grow through the short days of winter is more successful using supplemental light.

Two lighting systems are used, one adds to the growth of the plant by providing enough light to contribute to photosynthesis, the other adds only enough light to keep the plant vegetative and help prevent it from going into a dormancy period.

350 foot-candles of light (3,766 lux) is sufficient to supplement the growth of tuberous begonias. The day length should be extended to 16 hours or more. The lights should be turned on 2 hours before sunset, well before stomates close and photosynthesis shuts down.

Tuberous begonias can be kept vegetative and prevented from going dormant with less than the amount of light used to supplement growth. Night interruption or day length extension can both be used. This lighting is sometimes called "mum lighting" because of the practice often being used in the production of chrysanthemums. If night interruption is used, turn the lights on in the middle of the night for 1.5 or more hours. If using the lights for day length extension, increase the day length to more than 12 hours. Keep in mind that low levels of light do not contribute to the photosynthesis of the plant and plants growing under low light can become etiolated. Therefore, the best practice is to use the minimum of low level light to achieve the effect while most of the actual active growth occurs during normal daylight

Temperatures: Day temperatures between 65°-70°F with nights of 55°-60°F produce well-formed plants. Higher temperatures produce soft and leggy plants. Temperatures above 80° F are not tolerated well. Additional humidity is helpful during hot weather.

Air: Good air circulation is important, especially in the prevention of powdery mildew and botrytis.

Pests: Insect screening on greenhouses is the best pest preventative. But, in its absence, the following chemical controls have proven effective.

Aphids: The green peach aphid is the aphid most often seen on begonias. Good control is not difficult. Malathion, Orthene and pyrethroids have shown good results. Insecticidal soaps are effective, but damage to the begonia flower has been observed.

Thrips: Thrips on begonias can be difficult to control if they are present at a time when they can find refuge in unopened blossoms. The chemicals Orthene, and pyrethroids have shown some effect. Orthene as a tank mix with pyrethroids has been shown to be more effective than either material used separately or in rotation. Conserve (Spinosad) and Metaldehyde are good materials to use in a thrips spray rotation.

Fungus Gnat: Fungus gnats were for years thought to be a nuisance only. We now know they are able to spread soil-borne diseases. Their presence in the finished pot also detracts from its appeal. Control can be achieved by eliminating the larval stages with drenches of "Gnatrol" or Diazinon. The adult can be reduced by use of the Resmethren total aerosol generators.

DISEASES:

Powdery Mildew: Uneven day and night temperatures, coupled with dramatic changes in relative humidity, favor the development of powdery mildew. Good air movement, along with stable temperature and humidity levels, will help prevent the outbreak of this disease. Prevention is key. Once infected it is very difficult to cure. Below are preventative fungicides;

1. Triflaxystrobin & Triadmefon Trade Names: Strike/Bayleton sprayed at 4 oz. per 100 gal. every 30 days provides good mildew control, but is also used as a PGR. Too early application on young plants may cause stunted growth and may result in fewer flowers on some varieties.
2. Chlorothalonil; Trade names: Ortho MAX, Fungonil, Daconil, Bravo, Echo
3. Triforine; Trade names: Funginex, Ortho Rose Pride

Pythium/Phytophthora: These are soil-borne diseases, which are spread by water. Use clean sterilized potting soil. Avoid splashing water from pot to pot and onto leaves. Don't allow runoff from one pot onto or into another pot.

Subdue and Aliette at labeled rate have been effective.

Botrytis Blight: Botrytis needs free water on the plant for several hours in order to develop. Water early in the day to insure that the plants are dry going into the night; keep the relative humidity fairly low at night and in the early morning. Always provide good air circulation.

Daconil 2787, Chipco 26019 and Ornalin provide control.

Plant Growth Regulators:

Cycocel at 150-250 ppm combined with B-9 (2 scoops per gallon) foliar spray on young plants after first leaves appear at 1-2" height appears to be the most effective PGR with least side effects. It is suggested to test first in your location to obtain best results. Strike/Bayleton; see Powdery Mildew section above.

NOTE: These instructions for Pest, Disease and PGR control are not a prescription or a guarantee, nor are they recommendations or endorsements of any of the chemicals mentioned. Always check registrations in your area before applying.

TIMING:

Tuberous begonias do not bloom like clockwork. Started warm, they will come on more quickly. Buds will show color and begin opening throughout an 8 to 14 week period after planting. Plants will continue blooming through October or until first frost.

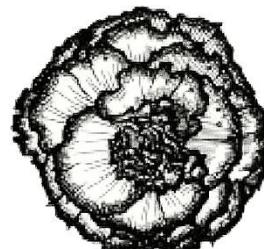
TUBERS VS. SEEDLINGS:

Tubers bloom slightly faster than seedlings and the resulting plants are very different. Seedlings will have 50% of the plants with color 15 weeks from sowing. A tuber produces husky plants with thicker stalks and sturdier leaves. Tuber-grown plants have a more specimen-like quality. Seedlings produce good color, but don't fill out as quickly as tuber-grown plants. Therefore, more plants are required per container. However, the presence of the leaves on seedlings allows proper plant orientation immediately, and assures mounded, outward-facing color. For your customer, the plants will be very similar after they have had them for a while.

AFTER-SALES TIP—Contrary to popular opinion, most homes do have good places for begonias. These include northern exposures, those moist areas beside outdoor water taps and shaded areas in the garden. All these areas can be lit up with the iridescence of begonia colors.

AmeriHybrid® Begonias

The American Tuberous Begonia



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