**PROPAGATION**

Upon receipt, open cuttings and stick immediately. If cuttings cannot be stuck upon arrival, store in a cooler at 50-55°F (10-13°C) with near-100% humidity. Wet the floor to maintain high humidity. Mist cuttings with water if they appear wilted or dry.

**Stick cuttings with a powder rooting hormone.** Alternatively, 100 ppm KIBA can be drenched after sticking (3-4 gallon per 100 square feet). Some leaf curl may occur, but leaves relax within a few days. Capsil should be applied at a rate of 2-4 oz. per 100 gallons of water after sticking to reduce wilting.

**Light levels** should be maintained no higher than 1000 footcandles the first 1-2 days after sticking and be increased gradually as cuttings callus and root.

**Misting** should maintain a film of water on the leaves, but over-misting should be avoided. Root media temperature should be maintained at 73-75°F (22-24°C).

**Callus formation** should be visible by day 7. Gradually reduce misting frequency as roots develop. An early PGR application can be beneficial to vajarous varieties at this stage to avoid stretch.

**Begin to fertilize** as soon as roots begin to form with a 100 ppm N, no-phosphorous formulation. **Monitor for fungus gnats** during propagation, especially during days 7-10. An insecticide should be applied if the presence of adults and/or larvae is observed. Application of an insecticide should be made no later than day 7 to prevent infection of the stem by larvae.

By day 15, roots should have expanded to the edge of the cell. Continue toning the crop by increasing air movement and light intensity. Misting should be greatly reduced during the day and stopped overnight. PGRs may be needed on vigorous varieties.

**Vegetative growth**

- **Cool temperatures will slow overall growth**, while high temperatures can cause heat delay, leaf edge burn and foliage distortion.

**PGRs** can be applied if no growth regulators were applied in propagation or to prevent lateral stretch.

- If needed, chlormequat at 500-1000 ppm may be applied in propagation or to prevent lateral stretch.

- To slow growth, apply paclobutrazol drench at 0.25-2 ppm prior to flower initiation. Alternatively, a tank mix of 1000-2000 ppm daminozide and 500-1000 ppm chlormequat can be applied before or after flower initiation.

**Common pests & diseases** include whitefly, fungus gnats, mites, *Pythium*, *Phytophthora*, *Rhizoctonia*, and powdery mildew. Proactive IPM practices should be utilized.

**Flower initiation**

- **Be aware of light pollution sources that can negatively affect flower induction**, including security lights, street lights and/or nearby traffic.

**Fluffing bracts** can be achieved with an application of GA₆, 6-BA (Fascination/Fresco) at a rate of 1-5 ppm at the “fish lips” stage of cyathia development.

- Adequately wetting the bract is essential to obtain a uniform response. Typically, this will be 6-10 oz. of Capsil per 100 gallons of spray solution.

**VEGETATIVE GROWTH**

Focus should be on vegetative growth once plants have recovered from pinch to ensure that plant is on target to finish according to specifications. High light from pinch to start of short days promotes strong stems at time of ship.

**Pot-tight spacing** can encourage V-shaped habit on some cultivars, but is not needed on naturally V-shaped habits. Plants should be spaced once leaves begin to overlap.

<table>
<thead>
<tr>
<th>Pot size</th>
<th>Minimum spacing</th>
<th>Ample spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6” (15 cm)</td>
<td>10x12”</td>
<td>14x14”</td>
</tr>
<tr>
<td>8” (19 cm)</td>
<td>16x16”</td>
<td>24x24”</td>
</tr>
<tr>
<td>10” (22 cm)</td>
<td>20x20”</td>
<td>30x30”</td>
</tr>
</tbody>
</table>

**Fertilizer** is recommended at a constant feed of 100-200 ppm N from a balanced formulation, including minor nutrients.

- **Molybdenum and calcium** are particularly important.
- **pH** should be maintained between 5.8-6.2.
- **EC** should be maintained between 1.0-1.5.
- **Weekly calcium foliar sprays from calcium chloride encourage strong growth, prevent leaf edge burn, and prevent bract edge burn.** A small portion of the crop should be tested 3-4 days prior to spraying entire crop. To increase stem elongation, increase phosphorous rate by approximately 10 ppm.

- If feeding less than 200 ppm N, add micronutrients as needed to deliver 1 ppm iron, 0.5 ppm manganese, 0.5 ppm zinc, 0.25 ppm copper, 0.25 ppm boron and 0.1 ppm molybdenum.

**Flower initiation**

- **Temperature** should be maintained between 68-78°F (20-26°C) during the day and 65-70°F (18-21°C) during the night. Temperatures can be manipulated to regulate growth.
- **Utilize positive DIF** to increase stem elongation.
- **Utilize negative DIF** to slow stem elongation.

**Chemical PGRs** such as Gibberellin A₆, 6-BA (Fascination/Fresco) can be applied during the vegetative growth stage to achieve final plant height specifications.

- **Sprays** can cause significant bract regreening when applied just before and during early bract development. Bract regreening is much less likely to occur with drenches.
- **Ensure thorough application and drench along with 200-250 ppm N from a 20-10-20 formulation.** For each additional 1 ppm of GA₆, 6-BA applied, an additional 1-2” of stem elongation can be expected. Labels allow for the following application types:

<table>
<thead>
<tr>
<th>Product</th>
<th>Spray</th>
<th>Drench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fascination®</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fresco®</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- **To slow growth, apply paclobutrazol drench at 0.25-2 ppm prior to flower initiation.** Alternatively, a tank mix of 1000-2000 ppm daminozide and 500-1000 ppm chlormequat can be applied before or after flower initiation.

**In general,** most early-season cultivars initiate approximately September 10-15, while most mid- and late-season cultivars initiate approximately September 25.

- **Temperatures below 65°F (18°C) in September encourage flower initiation, while night temperatures above 70°F (21°C) delay initiation.**

**Shading** may be utilized to create artificial short days and initiate early flowering. Shade cloth should not allow more than 0.5 footcandles of light to penetrate the cloth.

- **Crops should be shaded for a minimum of 12 hours to initiate flowering.**

**Establishment**

- **If receiving rooted cuttings, unpack liners immediately and transplant within 48 hours.** If transplanting is delayed, fertilize liners every other day with 100-200 ppm N. Rinse foliage with clear water to avoid phosophorus damage. Do not allow media to dry out as this will increase the probability of future *Pythium* infections.

**Growing media** should be moist at transplant. Water in thoroughly after transplant using 100-200 ppm N from a complete fertilizer.

**Irrigation** should be closely monitored during establishment.

- **Young plants** should never be allowed to wilt. Monitor the moisture level directly around the liner until the roots expand into the surrounding media.

**Fertilize** after transplant with 200-250 ppm N to establish. **Potassium** should be increased gradually as cuttings callus and root.

**In general,** the number of nodes remaining should match the finish container size, i.e., 4-5 nodes for a 4” (10 cm), 5-6 nodes for a 6” (15 cm), 7-8 nodes for an 8” (19 cm). Leaving too many nodes will encourage weak, horizontal growth and is not recommended.

- **If needed, chlormequat at 500-1000 ppm may be used based on program needs.** Always follow label directions.

**Pinching** should take place when roots reach the edge of the growing container, approximately 10-14 days after transplant or 4 to 5 weeks after direct sticking.

- **Increase light levels** to 5000 footcandles after transplant with 200-250 ppm N to encourage flower initiation, while night temperatures above 70°F (21°C) delay initiation.

**Fluffing bracts** can be achieved with an application of GA₆, 6-BA (Fascination/Fresco) at a rate of 1-5 ppm at the “fish lips” stage of cyathia development. Adequately wetting the bract is essential to obtain a uniform response. Typically, this will be 6-10 oz. of Capsil per 100 gallons of spray solution.

**Temperatures** must be above 65°F (18°C), with best results at temperatures between 68-70°F (20-21°C).
Upon receipt, open cuttings and stick immediately.
- If cuttings cannot be stuck upon arrival, store
  in a cooler at 50-55°F (10-13°C) with near-100%
  humidity. Wet the floor to maintain high humidity.
  Mist cuttings with water if they appear wilted or dry.

Stick cuttings with a powder rooting hormone.
Alternatively, 100 ppm KIIBA can drenched after
sticking (3-4 gallon per 100 square feet). Some leaf
curl may occur, but leaves relax within a few days.
Capsi should be applied at a rate of 2-4 oz. per 100
gallons of water after sticking to reduce wilting.

Light levels should be maintained no higher than
1000 footcandles the first 1-2 days after sticking and
be increased gradually as cuttings callus and root.

Misting should maintain a film of water on the
leaves, but over-misting should be avoided.
Root media temperature should be maintained
at 73-75°F (22-24°C).

Temperature after transplant should be maintained
between 75-85°F (24-30°C) during days and 70-
75°F (21-24°C) during nights. Once liners are well-
established, temperatures can be reduced to 70°F
(21°C) during days and 65°F (18°C) during nights.

Callus formation should be visible by day 7.
Gradually reduce misting frequency as roots develop.

An early PGR application can be beneficial to
vavorous varieties at this stage to avoid stretch.

Begin to fertilize as soon as roots begin to form
with a 100 ppm N, no-phosphorous formulation.

Monitor for fungus gnats during propagation,
especially during days 7-10. An insecticide should be
applied if the presence of adults and/or larvae is
observed. Application of an insecticide should be
made no later than day 7 to prevent infection of the
stem by larvae.

By day 15, roots should have expanded to the edge
of the cell. Continue toning the crop by increasing
air movement and light intensity. Misting should be
greatly reduced during the day and stopped overnight.
PGRs may be needed on vigorous varieties.

If receiving rooted liners, unpack liners
immediately and transplant within 48 hours.
If transplanting is delayed, fertilize liners every other
day with 100-200 ppm N. Rinse foliage with clear
water to avoid phosphorous damage. Do not allow
media to dry out as this will increase the probability
of future Pythium infections.

Growing media should be moist at transplant.
Water in liners thoroughly after transplant using
100-200 ppm N from a complete fertilizer.

Irrigation should be closely monitored during
establishment.
- Young plants should never be allowed to wilt.
  Monitor the moisture level directly around the liner
  until the roots expand into the surrounding media.

Fertilize after transplant with 200-250 ppm N to
charge the growing media. Rinse leaves with clear
water after fertilizing to avoid phosphorous damage.

Increase light levels to 4,500 footcandles after
transplant. Shading and/or misting should be used at
higher light levels to avoid wilting. Full light is
desirable once plants start rooting out/no longer wilt.

Temperature after transplant should be maintained
between 75-85°F (24-30°C) during days and 70-
75°F (21-24°C) during nights. Once liners are well-
established, temperatures can be reduced to 70°F
(21°C) during days and 65°F (18°C) during nights.

• Cool temperatures will slow overall growth, while
  high temperatures can cause heat delay, leaf edge
  burn and foliage distortion.

PGRs can be applied if no growth regulators were
applied in propagation or to prevent lateral stretch.
- If needed, chlormequat at 500-1000 ppm may be
  used based on program needs. Always follow label
directions.

Pinching should take place when roots reach the
edge of the growing container, approximately 10-
14 days after transplant or 4 to 5 weeks after direct
sticking.
- In general, the number of nodes remaining should
  match the finish container size, i.e., 4-5 nodes for a 4”
  (10 cm), 5-6 nodes for a 6” (15 cm), 7-8 nodes for an
  8” (19 cm). Leaving too many nodes will encourage
  weak, horizontal growth and is not recommended.
-李白 should be applied before and/or after
  pinching to control stem elongation and leaf
  expansion if plants cannot be pre-spaced within two
  weeks following pinching.
- Plants given a “hard” pinch, only leaving mature
  leaves, do not benefit from leaf removal at time of
  pinch.
- A softer pinch, leaving immature leaves, results in
  the development of large “flag” leaves. Removal of
  these immature leaves improves uniformity of lateral
  shoot development, as immature leaves contribute to
  apical dominance until the leaf is mature.

In general, most early-season cultivars initiate
approximately September 10-15, while most mid-
and late-season cultivars initiate approximately
September 25.
- Temperatures below 65°F (18°C) in September
  encourage flower initiation, while night temperatures
  above 70°F (21°C) delay initiation.

Shading may be utilized to control artificial short
days and initiate early flowering. Shade cloth should
not allow more than 0.5 footcandles of light to
penetrate the cloth.
- Crops should be shaded for a minimum of 12 hours
to initiate flowering.

Focus should be on vegetative growth once plants
have recovered from pinch to ensure that plant is on
target to finish according to specifications. High light
from pinch to start of short days promotes strong
stems at time of ship.

Pot-tight spacing can encourage V-shaped habit
on some cultivars, but is not needed on naturally
V-shaped habits. Plants should be spaced once leaves
begin to overlap.

Temperatures should be maintained between
68-78°F (20-26°C) during the day and 65-70°F
(18-21°C) during the night. Temperatures can be
manipulated to regulate growth.
- Utilize positive DIF to increase stem elongation.
- Utilize negative DIF to slow stem elongation.

Chemical PGRs such as Gibberellin A₄, 6-BA
(Fascination/Fresco) can be applied during the vegetative
growth stage to achieve final plant height
specifications.
- Sprays can cause significant bract regrowing when
  applied just before and during early bract development
  Bract regrowing is much less likely to occur with
  drenches.
- Ensure thorough application and drench along with
  200-250 ppm N from a 20-10-20 formulation.
- For each additional 1 ppm of GA₄, 6-BA applied,
  an additional 1-2” of stem elongation can be expected.
Labels allow for the following application types:

<table>
<thead>
<tr>
<th>Product</th>
<th>Spray</th>
<th>Drench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fascination*</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fresco*</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Typ®</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- To slow growth, apply paclobutrazol drench at
  0.25-2 ppm prior to flower initiation. Alternatively, a
  tank mix of 1000-2000 ppm dimazinoe and 500-1000
  ppm chlormequat can be applied before or after flower
  initiation.

Common pests & diseases include whitefly, fungus
gnats, mites, Pythium, Phytophthora, Rhizoctonia, and
powdery mildew. Proactive IPM practices should be
utilized.