

Commercial Greenhouse Production

Poinsettia Propagation

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Successful poinsettia propagation begins with high-quality cuttings and an ideal rooting environment. This publication describes optimal greenhouse conditions and management practices for improving propagation success and minimizing losses.

Prepare the Propagation House

Poinsettia rooting requires a properly functioning greenhouse environment. Before harvesting or receiving non-rooted cuttings, make sure your misting or fog systems are functioning properly and not clogged, and thoroughly clean your propagation area to ensure it is free of pathogens, insects, algae, weeds, debris, and freestanding water.

High-quality water is important for propagation, so measure your water pH, electrical conductivity, and alkalinity and make any necessary adjustments.

Start with Healthy Cuttings

There are generally two sources of cuttings: your own stock plants or plants purchased from a supplier.

Depending on growing conditions, you can generally harvest cuttings of most cultivars from stock plants approximately five to seven weeks after the last pinch. However, cutting quality and maturity at harvest are often determined by the time since the last pinch. For most cultivars, rooting quality is highest when cuttings are harvested five to six weeks after the last pinch.

Industry specifications call for terminal stem cuttings with short internodes that are 2 to 2.5 inches long (5 to 6 cm) and have two or three mature leaves. A stem diameter (caliper) of 0.16 to 0.24 inches (4 to 6 mm) is desirable, but can vary by cultivar.

When harvesting cuttings, disinfect tools with 10 percent bleach or trisodium phosphate (TSP) solution between stock plants. Avoid damaging leaves or stems as it can lead to greater disease incidence or uneven plant development. Also, take care to prevent exuded latex from cut stems from contacting adjacent cuttings or leaves as this can cause leaf distortions. Keep cuttings in a shaded area and quickly transfer them to a cool location after harvest.

If you purchase non-rooted cuttings from a supplier, they most likely come from offshore production facilities in Costa Rica, Guatemala, Kenya, or Mexico. The cuttings are often wrapped in moistened paper and packaged in boxes with ice packs.

Upon receiving them, unpack the cuttings, inspect them, and immediately place them in propagation. If immediate propagation isn't possible, place the opened boxes overnight in a humid cooler at 50 to 55°F (10 to 13°C) and stick the following morning. Do not allow cuttings to dehydrate at any point during storage or propagation.



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Whether you harvest or purchase cuttings, visually inspect them before rooting to make sure they are vegetative, disease- and insect-free, and uniform in length, caliper, and maturity. Non-vegetative or non-uniform cuttings root and develop unevenly, which can lead to a delayed crop.

Root in the Right Medium

You can root poinsettia cuttings directly into the finished container (direct stick). You also can root them in a range of media, including a peat and perlite mix, foam, Rockwool, or in Oasis® or Agrifoam® propagation trays, strips, or liners, which can be shaped as cubes, plugs, wedges, or pellets.

Regardless of technique, the optimal pH for the rooting medium is 5.8 to 6.3. The medium must support the cuttings, have good porosity, and adequate water holding capacity.

When rooting, insert approximately 1 inch of the cutting into the rooting medium. At this time, remove only lower leaves that would be in the rooting medium. Only remove large leaves if they will cover the stem apices of adjacent cuttings.

Use Rooting Hormone Carefully

Poinsettia cuttings generally root well without rooting hormone. However, you can improve rooting uniformity by dipping the lower 0.75-inch of the stem into a rooting hormone solution or powder. Suggested rooting hormone concentrations are:

- Indole-3-butyric acid (IBA) at 1,500 to 2,000 ppm
- IBA at 1,500 ppm plus naphthaleneacetic acid (NAA) at 500 ppm

Avoid any contact of the rooting hormone with the leaves or petiole as this can lead to twisted or distorted leaves (epinasty).

After sticking the cuttings there are two development stages before toning:

- Callus formation
- Root initiation and development

Stage 1: Callus Formation

Mist Regularly

Seven to ten days after placing the cuttings in propagation, they will begin forming callus tissue around the stem base (Figure 1). This is the most critical stage of poinsettia plant propagation and you must avoid any stress from wilting or desiccation.

To minimize this stress, maintain a thin layer of moisture around the leaf surfaces at all times by:

- Keeping air circulation low (turn off all horizontal air flow fans)
- Keeping humidity high (90 to 100 percent)

The frequency of misting depends on specific system and greenhouse conditions such as light intensity, temperature, humidity, and air movement (Figure 2). Mist most frequently between 10 a.m. and 6 p.m. Nighttime misting is only required the first three to four nights.



Figure 1. Callus tissue forms around the stem base seven to ten days after placing the cuttings in propagation.



Figure 2. Mist poinsettia cuttings most frequently between 10 a.m. and 6 p.m.

After the cuttings have callused, reduce misting frequency but avoid wilting. A single application of a spreader-sticker (CapSil®) to the cuttings can reduce surface tension and water beading and promote uniform coverage of moisture across the leaf surface (Figures 3 and 4). Apply CapSil® until run-off at a rate of 300 ppm (4 fluid ounces per 100 gallons of water).

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Figure 3. A spreader-sticker application can promote uniform coverage of moisture on leaf surfaces.



Figure 4. Without a spreader-sticker, moisture can bead on leaf surfaces.

Monitor Lighting and Maintain Temperatures

Light transmission in the propagation house should be indirect or diffuse. Whitewash or a combination of exterior shade on the glazing with retractable internal shade curtains will provide a good system for light modulation, especially in summer.

During stage 1, the maximum light intensity should be 1,000 to 1,250 foot-candles (200 to 250 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) or a daily light integral (DLI) of 4 to 5 $\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$.

Optimal rooting occurs when media temperatures are maintained (usually with bottom heating) between 79 and 83°F (26 to 28°C). Maintain air temperatures between 76 and 82°F (24 to 28°C) during the day and 70 to 74°F (21 to 23°C) at night. For the first

three nights after rooting, maintain air temperatures between 68 and 70°F (20 to 21°C) to help reduce moisture loss and desiccation.

Make Timely Growth Regulator Applications

Growth retardant sprays such as chlormequat chloride (Cycocel® or Citadel®) or chlormequat chloride plus daminozide (B-Nine® or Dazide®) will help prevent stretch in propagation. Apply growth regulators early in the morning or in the evening when shutting off the greenhouse's mist system for approximately 30 minutes will not stress the cuttings. Make the first application six to seven days after placing the cuttings in propagation.

Stage 2: Root Initiation and Development

Increase Light, Reduce Temperature

Root growth generally initiates 10 to 14 days after the propagation process starts (Figure 5). At that time, you can increase light intensity to 1,250 to 1,500 foot-candles (250 to 300 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) or a DLI of 5 to 6 $\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$. But the light should remain diffuse.

You also can reduce media temperatures to 72 to 79°F (22 to 26°C). Air temperatures can be reduced to 75 to 80°F (24 to 27°C) during the day and 68 to 70°F (20 to 21°C) at night.

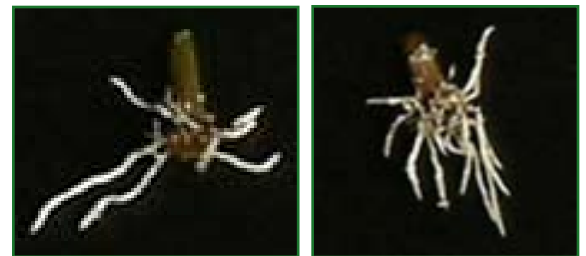


Figure 5. Root development after 14 days (left) and 17 days.

Fertilize to Prevent Deficiencies

Media leaching from misting can lead to nutrient deficiencies. Prevent deficiencies by incorporating a fertilizer into the mist system ten days after initiating propagation (50 to 75 ppm nitrogen and potassium, plus micronutrients). Alternatively, water cuttings every four or five days with a solution containing 150 to 200 ppm nitrogen and potassium, plus micronutrients. Do not use phosphorus fertilizers because foliar applications can distort leaves.

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Toning for Finishing Environment

Seventeen to 21 days after initiating propagation, your cuttings should have developed a root system, so they can grow under drier and brighter conditions. At this time, you can make a second growth regulator application.

Restoring air circulation now will help tone the cuttings and get them acclimated to the finishing environment. You can increase maximum light levels to 2,000 to 3,000 foot-candles (400 to 600 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) or a DLI of 7 to 8 $\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$, and reduce air temperatures to 72 to 75°F (22 to 24°C).

Minimize misting to about every 30 to 40 minutes from 8 a.m. to 6 p.m. Between 21 and 28 days after initial sticking, the cuttings are ready to be removed from the propagation area (Figure 6).

Insect and Disease Management

The warm, wet, and humid propagation environment make poinsettia cuttings susceptible to several diseases — *Botrytis* (Figure 7), bacterial soft rot (*Erwinia*), *Rhizoctonia* — and insects — fungus gnats, shore flies, whiteflies.

Fungus gnat larvae damage poinsettia cuttings by feeding on young roots and callus tissue. They also transmit diseases. Avoid saturating the rooting medium as this will delay rooting and increase the risk of fungus gnats and disease.

By carefully following the above protocols you will minimize cutting losses and provide an ideal propagation environment for your poinsettia cuttings.

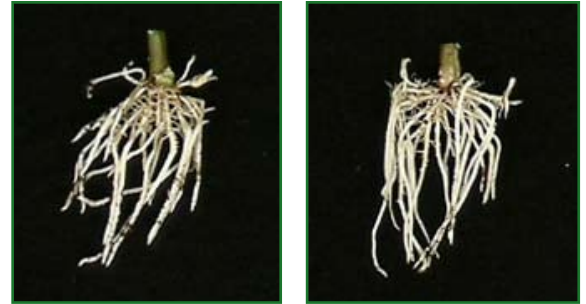


Figure 6. Root development after 21 days (left) and 24 days.



Figure 7. *Botrytis* on poinsettia cuttings.

Figure 1 provided by Royal Heins. All other photos by Roberto G. Lopez.

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