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Poinsettia Production

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History of Poinsettias

Native to Mexico, poinsettias (*Euphorbia pulcherrima*) originated in a region near Taxco City. It was first brought to the United States in 1825 by Joel R. Poinsett, a botanist and plantation owner from Greenville, SC. During a December visit to Taxco City, he found poinsettias blooming and sent several plants back home. Poinsett propagated the plants and distributed them to friends and various botanical gardens. To honor his role in introducing the plant to the United States, the plant was given the common name of "poinsettia."

Poinsettias are strongly associated with Christmas in the United States and throughout Central America because of the plants' color and blooming time. National Poinsettia Day was established on December 12 in honor of Joel R. Poinsett, who died on December 12, 1851.

While a nursery owner named Robert Buist is credited as the first person to sell poinsettias in the United States, the industry was pioneered and developed by the Ecke family, specifically Albert and Paul Ecke, who started growing poinsettias in the Hollywood and Beverly Hills areas of California in the 1920s. Even today, the Paul Ecke Ranch is the major producer of poinsettia mother plants (a plant that provides cuttings for growing the next generation of plants), providing poinsettia cuttings for commercial growers across the United States.

Poinsettia Economics

Since its introduction to the United States in the 1800s, poinsettias have been cultivated and sold in many countries around the world. As an iconic symbol of the holiday season, it is the most popular holiday crop worldwide with primary markets in the United States, Germany, Mexico, Italy, Spain, and the Netherlands.

In the United States, poinsettias are one of the most important greenhouse ornamental crops in the horticulture industry. According to the U. S. Department of Agriculture (USDA) National Agricultural Statistical Service (NASS) Census of Horticulture, retail sales of poinsettias reached more than $215 million in 2019 (Gula, 2022; Yu & Gu, 2024). Commercial poinsettia production occurs in all 50 states. Among them, California is the top-producing state, followed by North Carolina, Florida, Virginia, New York, Texas, and Ohio. Domestic poinsettia production does not meet demand, so an additional 2.2 million live poinsettias worth $11.5 million were imported from Canada in 2022 (Kaufman, 2022).

Poinsettia production in Georgia was significant at one time (in 2004), with about 500 greenhouse producers growing poinsettias. However, water restrictions related to a severe drought and the economic downturn in 2007–2008 hit the industry hard, and many growers closed their operations.

Currently, Georgia only has a small number of greenhouse growers who produce commercially significant numbers of poinsettias, but they still produce half a million poinsettias annually. For the past several years, the Georgia floral industry has gradually recovered and offers opportunities for new poinsettia growers.

Plant Description

In its native habitat, poinsettias are deciduous to semievergreen shrubs that can reach 10 ft in height. However, they typically are grown as greenhouse container plants that are less than 2 ft tall (Figure 1). Poinsettia plants grow best in part shade with a temperature between 60–70 °F.

Although poinsettia plants are not poisonous, they do produce a white, sticky sap that can cause a skin rash, especially for people with latex allergies. As a safety precaution when working with this plant, wear gloves and avoid contact with the eyes or mouth. Additionally, if a significant amount of the plant is eaten by animals or people, it can cause a mild stomachache.

Figure 1. Poinsettias in Containers Produced in Commercial Nurseries.

When it comes to plant parts, there is always confusion about poinsettias. The showy colorful "flowers" actually are ***bracts***, which are modified or specialized leaves. These bracts come in many forms, sizes, colors, shapes, and textures. The actual flowers are the small, light green to yellow structures that grow in the center of the bracts (Figure 2). To differentiate leaves from bracts, look at its location: leaves are everywhere along the stem, while bracts are located on a stem below a flower, flower stalk, or inflorescence.

Figure 2. Poinsettia Bracts (Leaves) and Flowers.
Bract marked by white arrows, flowers marked by black arrows

Poinsettias are a short-day plant whose flowering is induced when the night is at least 11.75 hr in length with no light interruption. To induce poinsettia flowering, growers cover benches with black cloth to increase the period of darkness (i.e., shorten the day length; Taylor et al., 2011). Alternatively, photoperiodic lights can interrupt the dark period to prevent flowering and keep growth vegetative. By manipulating the day length, growers are able to schedule poinsettia flowering and get plants to flower for the Christmas season.

After Poinsett's introduction, the poinsettia was rapidly propagated and distributed in the United States. Buist began selling the plants in the United States in the 1800s, and by the early 1900s, modern poinsettia production was underway. These early poinsettias do not have some of the favored features of the modern versions. For example, early poinsettias had a shorter flowering window as the bracts would only last for about 7–10 days, whereas modern poinsettias can last for 3 months.

In the 1950s, poinsettia breeding programs were established throughout the United States to improve the quality of poinsettias. The breeding effort was focused on ornamental features, specifically bract color, size, and compact structure. Paul Ecke is credited with much of the modern breeding work of poinsettias, along with other private companies in Florida, Ohio, and Nebraska. Today, poinsettia breeders are focused on improving poinsettia postharvest quality.

Poinsettia Production Cycle

The poinsettia production cycle starts in early summer (May–July, Figure 6), depending on the location. During this time, commercial growers start or prepare poinsettia rooted ***liners*** (small, rooted plants). In some cases, growers may start to produce poinsettia liners as early as February. However, the liner price for plants produced during the off-season will be much higher than those produced in early summer, which is the normal season for poinsettia liners. Poinsettia liners are potted in August, and by September, the poinsettia growing season is underway. Nurseries will have marketable poinsettias by November for the Thanksgiving market or by early December for the Christmas market.

Cultivar Selection

Currently, there are more than 100 poinsettia varieties and hundreds of cultivars. The current varieties could be categorized into different groups by **color**: white, cream, yellow, peach, pink, peppermint, novelty, Jingle Bell, purple, marbled, or red; by **vigor**: low, medium, or high; or by **flowering timing**: early, medium, or late.

Despite the many different poinsettia colors available, the traditional red poinsettia still accounts for the majority of sales (> 70%). North Carolina State Extension's poinsettia trial had more than 230 cultivars in 2023; more than 90 of them were red.

Table 1 lists some common and classic cultivars that are grown in the southern U.S. UF/IFAS has a more extensive list (available as a PDF) linked from their *Poinsettia Production Guidelines* website (https://hort.ifas.ufl.edu/floriculture/poinsettia/production_guidelines.shtml).

Table 1. Common Poinsettia Cultivars Grown in the U.S. South.

Varieties	Bract Color	Features	Sizes
Advent Red	Red	Early season, high vigor, heat tolerant	Any size
Enduring	Red, marble, pink, white	Medium vigor, heat tolerant	4–10 in.
Enduring Red	Red	Early season, heat tolerant	4–10 in.

Varieties	Bract Color	Features	Sizes
Freedom Pink	Pink	Medium vigor, heat/cold tolerant	4–10 in.
Freedom Early Red	Red	Early season, heat tolerant	Any size
Freedom Red	Red	Early season, heat tolerant	Any size
Golden Glo	Gold	Mid-season, compact vigor, heat tolerant	2 in., 2.5-in. pinched, mini-6 in.
Ice Punch	Red-white bicolor	Mid-season, heat tolerant	Mini to > 12 in.
Jubilee	Jingle Bell (red-pink bicolor), red, pink, white	Mid-season, high vigor, heat/cold tolerant	Mini to > 12 in.
Peterstar	Red, white	Medium vigor, heat tolerant	4 in. to >12 in.
Premium	Early Red, Ice Crystal, Lipstick Pink, marble, red, Picasso, Polar, white	Early season, heat tolerant	Any size
Prestige	Early Red, maroon	Early season	Any size
Princettia	Dark pink, hot pink, pink, pure white, Queen pink, red	Early season, compact	Miniature mixed bowls
Red Glitter	Red-white bicolor	Heat tolerant	4–10 in.
Red Soul	Velvety red	Medium vigor, heat tolerant	4–10 in.

Varieties	Bract Color	Features	Sizes
Runway Red	Red	Mid-season, heat tolerant	4–10 in.
Southern Belle	Red	Late season, medium vigor, heat tolerant	4–10 in.

Substrate Selection

Substrates (container soils) serve four major roles in plant production: support, gas exchange, nutrient supply, and water-holding. For poinsettias, substrate choice varies with production stage. There are several types of substrates for poinsettia cuttings and plants (see the next two sections).

Commercial poinsettia growers can either choose premixed substrates or mix their own depending on their personal preferences, previous experience, and operation size. Most of the premixed substrates for poinsettia production are peat moss-based, which provides good water-holding capacity and adequate air space.

Other growers, especially bigger operations, choose to mix their own substrate for poinsettia production. The own-mixed substrates typically are still peat moss-based and mixed with perlite, vermiculite, bark, moisture agents, and sometimes fertilizer and/or herbicides at different ratios.

It’s easy for growers to grow poinsettias with premixed substrates, as those mixes are often tested and well-suited for poinsettia growth. However, the cost of premixed substrates can be greater than mixing your own. Another reason why some growers choose to mix their own is that they are willing to experiment and explore ways to grow better plants than their competitors.

Substrates for Poinsettia Cuttings

Figure 3. Poinsettia Grown in Containers With a Premixed Substrate (left, middle) and Propagated in Rockwool (right).

Figure 4. Rooted Poinsettia Cuttings Growing in Premixed Substrate (left) and Transplanted Into 6-in. Containers (right).

During propagation, most premixed potting substrates can be used (Figures 3 and 4). Additionally, rockwool, perlite, and vermiculite, alone or mixed (using a perlite-to-vermiculite ratio of 70:30 by volume), can also be used for poinsettia propagation. Rockwool is used more in off-season poinsettia propagation (February to April) in hydroponics, with higher prices.

Substrates for Poinsettia Plants

When selecting substrates for poinsettia production, substrate physical properties, including air space (%), bulk density (g/cm^3), and water-holding capacity (%), need to be considered because they will affect management practices, including irrigation.

Air space measures the proportion of air-filled large pores (***macropores***) after drainage and influences gas exchange and water-holding capacity. Bulk density measures how much one unit of the substrate weighs. The lower the bulk density, the lighter and the better, because handling and shipping costs are based on the bulk density of the substrate. Water-holding capacity measures a substrate's ability to physically hold water against gravity (Yu & Gu, 2024).

For all container substrates, the recommended ranges are air space, 10%–30%; bulk density, 0.19–0.7 g/cm^3; and water-holding capacity, 45%–65%. When choosing a substrate mix for poinsettia production, ensure that the physical properties of the mix fall between the recommended ranges.

Poinsettia plants grow well in most commercially available premixed substrates, including peat moss-based and bark-based substrates. Both peat moss and bark have relatively low bulk density (0.09–0.11 g/cm^3 and 0.15–0.23 g/cm^3, respectively), and high water-holding capacity (58%–71% and 59%, respectively) and air space (8%–19% and 20%, respectively), allowing poinsettia roots to obtain water and exchange gas between the root ball and the atmosphere.

Commercial peat moss-based substrate mixes (for growing purposes) often have an air space, bulk density, and water-holding capacity of 3%–20%, 0.09–0.1 g/cm^3, and 58%–71%, respectively, while the pine bark-based commercial substrate mixes (for growing purposes) often have an air space, bulk density, and water-holding capacity of 12%–31%, 0.15 g/cm^3, and 47%–85%, respectively. Because of its water-holding capacity (59%–65%) and air space (17%–34%), perlite is often incorporated into premixed substrates to increase air space in the media.

There are several practical reasons why these physical properties of the substrate are especially significant for poinsettia production. The substrate provides a counterbalance for the plant's top growth. Poinsettias are produced in many container sizes, ranging from small (4-in. container) to very large (for a tree poinsettia, 10-in. or larger container), depending on the cultivar (see Table 1).

The bulk density of commercially available substrates is suitable for a standard 6-in. pinched poinsettia production (i.e., the plant is less than 1.5 to 2 times the height of the container). A standard 6-in. pot has a height of 10.8 cm, meaning a standard 6-in. pinched poinsettia plant should have a height of 16.2–21.6 cm (6.4–8.5 in.).

If cultivars are grown in pots that are too small, they can become top-heavy as they grow, causing extra labor issues and irrigation problems. Thus, it is critical to use the appropriate container size to grow the right poinsettia cultivars. Air space and water-holding capacity also play a critical role in irrigation practices. To avoid root-rot diseases in poinsettia plants, the amount of water needed is determined by the air space and the water-holding capacity of the substrate used.

Irrigation

The water used for irrigation needs to have a neutral pH (pH of 7) or slightly lower than 7 with a neutral electrical conductivity (EC = 0). The amount of water needed for poinsettia production depends on several factors, such as the type of production (cuttings or plants), substrate type, and irrigation methods.

Watering Poinsettia Cuttings

Unrooted cuttings are stuck into premoistened substrate and placed under mist. The cuttings need to be misted and maintained with a relative humidity of 80% to 90% to promote rooting. Leaves need to remain moist without the cuttings standing in water. In southern states like Alabama and Georgia, a heavy shade (70% to 90%) is recommended for poinsettia cuttings until they reach the callus stage. The quality of the rooted cuttings can be determined by the size of the cutting stem: rooted cuttings with a diameter of at least 0.25 in. are better than those with a diameter less than 0.25 in. Cuttings 3 in. in length with three to four fully expanded leaves indicate good-quality rooted cuttings.

If receiving rooted cuttings, unpack and irrigate immediately. Store cuttings in a cool area without direct sunlight, check them often, and irrigate as needed. To minimize stress from drought and heat, transplant the cuttings into the container (final production size) as soon as they are received.

Watering Poinsettia Plants

Poinsettia plants are susceptible to root-rot disease. The irrigation program and the substrate selection play a critical role in managing root-rot disease for poinsettia plants. As mentioned earlier, air space and water-holding capacity need to be used to determine the amount of water needed for each container.

Best management practices indicate that plants need to be irrigated with 10% to 15% drainage. How do you calculate the amount of water for this irrigation practice? Follow this example: A standard 6-in. pinched poinsettia plant is growing in a 6-in. container with a volume of 1,330 ml. The container is filled with a peat moss-based substrate whose air space and water-holding capacity are 15% and 70%, respectively. To calculate the amount of water needed, multiply the volume of the container by the sum of the percent water-holding capacity and percent air space. In this example, that is:

1,330 ml x (0.70 + 0.15) = (approximately) 1,130 ml

This calculation assumes that the substrate was fully drained. Experienced growers can adjust irrigation practices by checking the moisture content of the substrate surface (feel) and the drainage of each watering. If the substrate's air space is too large, plants will need more frequent irrigation, especially when the plants become mature and reach the shipping stage. Since the shipped plants (especially those for retail) will not be irrigated for 2–3 days, a substrate with higher water-holding capacity and balanced air space is preferred.

Poinsettias are irrigated with overhead, subirrigation, and drip methods. Hand-watering is used to supplement when necessary. Overhead irrigation is generally not recommended for poinsettia production for two main reasons. Poinsettia plants are fragile, and overhead irrigation may cause damage to the bracts. For the same reason, when hand-watering poinsettia plants, growers need to be careful about water pressure and place water heads near the substrate surface to prevent damage to the plant. Furthermore, overhead irrigation tends to create high humidity and applies water to foliage, increasing disease incidence. Therefore, drip irrigation and subirrigation are the preferred methods for poinsettia production.

Drip and subirrigation methods provide advantages such as water and fertilizer savings, reduced disease occurrence (because of lower humidity and no water on the leaves), and uniform irrigation and ***fertigation*** (fertilizer applied through irrigation). However, the initial cost for installing drip and subirrigation systems is higher than that of overhead irrigation. Furthermore, to distribute the water and fertilizer evenly and thoroughly to the root zone, a substrate with a higher percentage of peat moss is preferred, leading to potentially higher costs. Irrigation needs to be adjusted not only by the types of substrates used, but also by container size, plant stage, greenhouse temperature, and irrigation method.

Fertilization

Fertilization needs depend on the production stage. Poinsettia cuttings do not need fertilizer, while poinsettia plant production requires substantial fertilization. Poinsettia plants are heavy feeders, meaning they need high rates of fertilizer to grow well. There are many types of fertilizers that can be used for poinsettia production, such as slow-release fertilizers and water-soluble fertilizers with different formulations. Because water-soluble fertilizers release the nutrients to the plant faster than the slow-release fertilizers and provide more immediate effects on plant growth, they are used more often and typically applied with irrigation.

Depending on the cultivars and plant growth stage, fertigation may be applied every week (300–400 ppm nitrogen [N]), every irrigation (75–100 ppm N), or every other irrigation (125–150 ppm N; LSU Ag Center, 2022). The pH and EC of the substrate need to be checked on a regular basis to avoid the plants being over- or under-fertilized. The ***pour-through method*** to measure EC can provide fast results. To do this, irrigate the plants thoroughly, wait for 30 min, then place a saucer or a plate underneath the plant and collect the leachate. Then measure the EC of the leachate.

Slow-release fertilizer can also be used as a supplemental fertilizer for poinsettia production. There are several different timings of slow-release fertilizers, but the 3–4-month fertilizers are recommended for poinsettia production. When adding slow-release fertilizer, the fertigation rate needs to be reduced accordingly.

Plant Growth Regulators

Poinsettia plants can be grown as single-stem branched plants, multistem branched plants, or as trees. In the United States, single-stem branched poinsettia plants are typically grown in 6-in. to 10-in. containers, while multistem branched plants are grown in 4-in. to 12-in. containers. Poinsettia trees are often grown in 8-in. to 12-in. containers.

Normally, a 4-in. to 6-in. pot contains one cutting, 8-in. to 10-in. pots contain one to three cuttings, and larger pots or specialty crops may contain three to five cuttings. Depending on the cultivars, the production region (mainly for consideration of light intensity, day length, and temperature), spacing, and fertilizer, different growers adopt different methods to control poinsettia height during the production season.

Cultural practices, including irrigation, fertilization, spacing, low light intensity, and temperature, are often used to control poinsettia height during production. Reducing irrigation can restrict poinsettia growth, which is one way to control height. However, some cultivars are sensitive to wilt and can be damaged if kept too dry. Growers should be cautious when using irrigation for poinsettia height control to avoid damaging poinsettia plants.

Reducing the fertilizer rate can also be used to control height. However, reducing fertilizer rates from 300–400 ppm N to 150 ppm N or less could lead to nutrient deficiencies if implemented improperly.

Additionally, managing plant spacing offers another way to control poinsettia height. Usually, to promote “v” orientation or upright growth in plants, spacing plants apart from each other is recommended when poinsettia branches just begin to touch. A general rule for mature poinsettia plants (final spacing) is 1.5 square feet per 6-in. plant and 4.35 square feet per 8-in. plant (Hellmann, n.d.). Low light intensity, normally less than 3500 fc, along with spacing, can be used for poinsettia height control. When plants are placed too closely, light interception will be reduced.

Temperature is the most successful means for controlling poinsettia height without chemicals. Growers can manipulate the difference in day and night temperatures to alter plants’ growth rate during the production season. Temperature is more readily used by growers in the northern region than those in the southern region, where it is almost impossible to manipulate day and night temperatures enough to affect poinsettia height.

When cultural practices cannot be adjusted for poinsettia height control, plant growth regulators (PGRs) are commonly used. A-Rest, B-Nine, Bonzi, Cycocel, and Sumagic are commonly used and labeled PGRs for poinsettia (Lopes & Stack, 2003). Small and small-to-medium poinsettia cultivars such as ‘Freedom’ may not need PGRs, while medium and medium-to-large cultivars such as ‘Success’ often need PGRs for height control. Table 2 lists a general guide for PGR application.

Table 2. Plant Growth Regulators for Poinsettia Height Control.

PGR types	Application method	Timing
A-Rest	Drench	About 4 weeks after pinch or 8–12 weeks before finish
B-Nine	Spray	About 1–2 weeks after rooting
B-Nine + Cycocel	Tank mix, Spray	Only one application, early in the season
Bonzi	Spray/Drench	Apply at 7–14-day intervals
Cycocel	Spray/Drench	Apply at 3–14-day intervals
Sumagic	Spray	About 10–14 days after pinching

Poinsettia Production Schedule

Despite broad variations in production practices for poinsettia, nearly all poinsettia production is targeted for the Christmas-season market. Table 3 lists a guideline for producing typical 6-in. poinsettia plants. The actual schedule may differ among growers and with various poinsettia cultivars. Figure 5 shows a typical poinsettia production schedule in the South.

Table 3. Poinsettia Production Schedule.

Times	Practices
Week 0: July 1, August 1, or September 1	Drench fungicides, pot up rooted poinsettia plants, insecticide application
Weeks 2–4	Pinch
Weeks 4–6	Drench fungicide, PGR application if needed
Weeks 6–8	Starting color, drench fungicide
Weeks 8–10	Drench fungicide
Weeks 10–11	Adjust night temperature if needed
Week 12	Stop fertilizing
Week 13	Sale

Figure 5. Typical Poinsettia Production Schedule in the South. Images taken in College Station, TX, in 2019.

Poinsettia Pest Management

Poinsettias are susceptible to a variety of arthropod pests that can inflict severe economic damage because of their feeding activity on foliage and roots. Foliage feeders cause direct damage to the leaves and, in severe cases, can completely defoliate plants. Phloem feeders typically cause less aesthetic damage to plants, but their feeding activity deprives the plants of nutrients and may stunt plant growth.

Heavy infestations of some phloem-feeding insects, such as whiteflies or mealybugs, can promote the occurrence of sooty molds, which develop on the sugary excrement “honeydew” produced by these insects. These sooty molds can further reduce plant growth by interfering with photosynthesis, and their appearance can make plants unmarketable.

The key to managing pests in poinsettia production is to take an integrated pest management approach using a combination of cultural control, scouting, insecticides, and biological control. Being proactive when dealing with pests is critical, as options are limited once poinsettias begin to form bracts. Chemical insecticide use is recommended early on to clean plants. During production, pest populations are best maintained at low levels with beneficial insects. Just before shipping, a bract-compatible insecticide is applied.

Whiteflies

Whiteflies are the most serious pests of poinsettias and include the sweet potato whitefly (also called silverleaf whitefly), *Bemisia tabaci*. All whitefly life stages are typically found feeding on the underside of leaves, so proper scouting is critical to prevent rapid whitefly outbreaks. Monitor populations continuously during production with one yellow sticky card placed approximately every 2,000 square feet. Inspect cards weekly for signs of whitefly activity. Whitefly management is complicated because of the presence of the Q biotype of *B. tabaci,* which is resistant to many pyrethroids and neonicotinoids. In most cases, the B biotype of *B. tabaci* is also present in greenhouses and is susceptible to recommended insecticides (Table 4). The biotypes present in individual greenhouses can only be determined with molecular identification tools. The greenhouse whitefly, *Trialeurodes vaporariorum*, can also be a problem for poinsettia production.

Several biological control agents are available for whitefly management. If the crop is infested with *B. tabaci,* releases of the parasitoids *Eretmocerus eremicus* or *E. mundus* early in the production cycle can often help manage whitefly populations. Infestations of *T. vaporariorum* are better managed with the parasitoid, *Encarsia formosa*. Both parasitoid species attack whitefly nymphs. A mix of *Eretmocerus* and *Encarsia* is commercially available and is likely necessary. Success has been observed releasing one parasitoid per square foot at a 1:1 ratio of *Eretmocerus* to *Encarsia*.

Several generalist predators are also available for managing whiteflies on poinsettias, such as the predatory beetle *Delphastus catalinae,* the minute pirate bug, and many predatory mite species, such as *Amblyseius swirskii*. These predators can be released approximately 10 days after the first cutting treatments. Lower release rates of parasitoids (one per 5 square feet) can be combined with *D. catalinae* if beetles are released into pest hotspots.

Finally, entomopathogenic fungi, such as *Beauveria bassiana* and *Cordyceps* (formerly called *Isaria*) *fumosorosea* infect all whitefly life stages and biotypes and are excellent management options when applied early in production. Dipping cuttings in entomopathogenic fungi is useful for preventing the rapid buildup of whitefly populations. It is important to note that growers should purchase the wettable powder formulations as the emulsifiable concentrates can be phytotoxic when used on poinsettia cuttings.

Plant-Feeding Mites

Foliage-feeding mite species are arguably the second most problematic group of pests to poinsettias. The most important mite species on poinsettia are the two-spotted spider mite, *Tetranychus urticae,* and the Lewis mite, *Eotetranychus lewisi*. The broad mite, *Polyphagotarsonemus latus,* is an occasional pest. Leaf stippling and yellowing on the upper leaf surface are indicative of spider mite feeding damage, and webbing between the leaves during heavy infestations is another important diagnostic symptom.

Both chemical and biological control options are effective for managing spider mites on poinsettias. Several miticides are available to manage spider mites on poinsettias, but typically they are **not** used preventatively (Table 4). Multiple biological control options are available to manage mites on poinsettias. Excellent control of two-spotted spider mite can be achieved using the predatory mite *Phytoseiulus persimilis,* but this predator has little effect on Lewis mites, which are better managed using the predatory mite *Neoseiulus californicus,* among others, instead.

Thrips

Thrips are another group of foliage feeders that are occasionally problematic to poinsettias, although poinsettias are not a preferred host. The most damaging thrips species to poinsettias is western flower thrips, *Frankliniella occidentalis*. Both larvae and adults can cause direct damage to the leaves and bracts. Thrips are challenging to manage using insecticides. Spinosad and spinetoram + sulfoxaflor products are effective, but repeated applications are not recommended because of the risk of resistance development. Neonicotinoids (such as imidacloprid) can only partially suppress western flower thrips populations. Biological control options work well when used with softer chemical controls, such as insecticidal soap, horticultural oils, neem oil, and insect growth regulators. Thrips adults and larvae are managed using the minute pirate bug, *Orius insidiosus*. The thrips larvae can also be controlled using the predatory mite, *Neoseiulus cucumeris*. Control of thrips species that pupate in the soil, such as western flower thrips, can be enhanced using the entomopathogenic nematode, *Steinernema feltiae*. Nematodes can be applied through irrigation at all stages of poinsettia production.

Mealybugs

Historically, mealybugs have not been major pests of poinsettias, but are an emerging problem in many greenhouses, especially at the finishing stage. The most frequently encountered species are citrus mealybug, *Planococcus citri;* longtailed mealybug, *Pseudococcus longispinus;* Mexican mealybug, *Phenacoccus gossypii;* and Madeira mealybug, *Phenacoccus madeirensis*. Contact insecticides are not effective on mealybugs because of the waxy coating that covers their bodies. Systemic insecticides used for whiteflies often do well for managing mealybugs, and horticultural oils can be useful for smothering individuals (Table 4).

Fungus Gnats and Shore Flies

Damage to the roots of poinsettias is mainly due to the activity of fungus gnat larvae. The most common species are from the genus *Bradysia*. The two most important pest species in North American greenhouses are *B. impatiens* and *B. coprophila*. Fungus gnat larvae feed on fungi and other microorganisms in the growing media but will also feed on and damage developing roots. Larval feeding can cause poor rooting and wilting of cuttings and seedlings, and inhibit water and nutrient uptake. Fungus gnat larval feeding also makes plants more susceptible to pathogen entry through the wounds on the roots. Fungus gnat damage is most problematic during the mid- to late stages of propagation, where direct-stick programs and poor sanitation practices promote algal and fungal growth.

Unlike fungus gnats, shore flies (typically *Scatella stagnalis)* only feed on algae and other microorganisms and do not cause direct damage to plants. However, high numbers of shore flies can reduce the marketability of plants by affecting the bracts. They can be managed simultaneously with fungus gnats using similar recommendations, as both will likely be present when problems arise.

Monitoring the buildup of adult fly populations using yellow sticky cards is critical to preventing larval populations from reaching economically damaging levels and must begin early in production. Five to 10 fungus gnat larvae per plant container is considered a moderate infestation; however, thresholds for cuttings may be lower because of their increased susceptibility to larval feeding.

Water management is the most important control measure because proper soil moisture denies fly larvae the conditions necessary for development. Insecticides are used to target flies, but this is not an ideal strategy, and efforts should be focused on managing the larval stages. Infestations will not be eliminated unless larvae in the media are reduced. Insect growth regulators are effective in controlling the larval stages when used as a drench (Table 4).

There are four commercially available biological control agents for larval management: the entomopathogenic nematode *S. feltiae,* the predatory mite, *Stratiolaelaps scimitus,* the predatory beetle, *Dalotia coriaria,* and the soil bacterium, *Bacillus thuringiensis* subspecies *israelensis* (*Bti*). Of these control options, *S. feltiae* appears to be the most effective on fungus gnats and is comparable to many insecticides. Both *S. feltiae* and *Bti* can be applied as a drench to propagated material through an irrigation system or a foliar spray.

Table 4. Chemical Insecticides for Insect and Mite Control on Poinsettia.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
Abamectin	Foliar spray	Mites, whiteflies (B), thrips	6	Save for after bract formation.
Acephate	Foliar spray	Whiteflies (B& Q), thrips	1B	Apply as needed every 10 days. Do not apply after bract formation.
Acetamiprid	Sprench	Mealybugs, whiteflies (B)	4A	Before bract formation. Rotate MOA.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
				pyridaben.
Acequinocyl Afidopyropen	Foliar spray	Mites Whiteflies, mealybugs	20B 9D	Apply as needed. [illegible] and
Azadirachtin	Sprench	Fungus gnat larvae, whiteflies (B&Q), thrips	18B	Apply 2–3 weeks after pinching. Wait a week between applications.
Bifenazate	Foliar spray	Mites	20D	Late season as needed. Use less than twice a year.
Bifenthrin	Foliar spray	Whiteflies (B), adult flies, mites	3	Apply as needed every 10 days.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
		es (B)		than two times per crop cycle, with 3 weeks between applications.
Chlorfenapyr / Buprofezin	Foliar spray	Mites, thrips / Mealybugs, whitefli	13 / 16	Apply as needed no more every 5–7 days.
Chlorpyrifos	Soil surface spray	Fungus gnat and shore fly larvae	1B	Apply as needed every 10 days.
Clofentezine	Foliar spray	Mites	10A	Apply as needed once per crop cycle.
Clothianidin	Foliar spray/drench	Whiteflies	4A	Apply 2–3 weeks after pinching. Rotate MOA.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
				mpatible with beneficials.
Cyflu[illegible]fen	[illegible]nch spray	[illegible] ybugs, whiteflies (B&Q), mites, thrips, adult flies	3A 25A	[illegible] once per crop cycle.
Cyromazine	Soil surface spray	Fungus gnat and shore fly larvae	17	Apply as needed every 10 days. Do not apply after bract formation.
Cyantraniliprole	Drench	Thrips, whiteflies (B&Q)	28	Apply 12+ weeks after pinching, compatible with beneficials.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
				production end.
Dinotefuran	Drench spray	Whiteflies (B&Q), [illegible]	4A	Apply just prior to bract formation to last until
Endosulfan	Foliar spray	[illegible] thrips	2	[illegible]
Etoxazole	Foliar spray	Mites (eggs and nymphs)	10B	Apply as needed, no more than two times per cycle > 6 months.
Fenbutatin oxide	Foliar spray	Mites	12B	Apply as needed every 10 days. Do not apply after bract formation.
Fenoxycarb	Fogger	Whiteflies B&Q (nymphs and pupae), thrips	7B	Apply as needed, with 2 days between applications.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
	y			ed every 10 days. Do not apply after bract formation.
Fenpyroximate Fenpropathrin	Foliar spray	Mites Whiteflies (B)	21 3	Apply as needed. Do not use in succession with acequinocyl and pyridaben.
Flonicamid	Sprench	Whiteflies (B), thrips	9C	Apply 6–8 weeks after pinching; compatible with beneficials.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
				with beneficials.
Flupyradifurone	Drench	Whiteflies (B), mealybugs, thrips	4D	Apply 6–8 weeks after pinching.
Hexythiazox	Foliar spray	Mites (eggs)	10A	Apply as needed once per crop cycle; compatible
Imidacloprid	Drench	Mealybugs, whiteflies (B)	4A	Apply 12+ weeks after pinching. Rotate MOA.
Lambda-cyhalothrin	Foliar spray	Thrips, mealybugs, whiteflies (A &B)	3	Apply as needed at weekly intervals.
Methiocarb	Foliar spray	Mites, thrips	1A	Apply every 10+ days, no more than two applications.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
				bract formation.
Pyridaben / Pymetrozine	Foliar spray	Mites, Whiteflies (B&Q) (B)	21 / 9B	Apply as needed. Do not use in succession with fenpyroximate and acequinocyl. / every 10 days. Do not apply after
Pyridalyl	Foliar spray	Thrips	UN	Apply as needed. Less than three applications per cropping cycle or within 6 months.
Pyriproxyfen	Soil surface spray	Fungus gnat and shore fly larvae, thrips pupae	7C	Apply as needed every 10 days. Do not apply after bract formation.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
luquinazon	r spray	ybugs, whiteflies (B&Q)		y as needed every 10 days. Do not apply after bract formation.
S-kinoprene	Foliar spray/drench	Mealybugs, whiteflies (B), fungus gnat and shore fly larvae	7A	Apply as needed every 10 days. Do not apply after bract formation.
Spinosad	Foliar spray	Thrips	5	Save for after bract formation.
Spiromesifen	Foliar spray/drench	Mites, whiteflies (B&Q)	23	Apply 2–3 weeks after pinching, and again as needed.

Active ingredient	Application method	Target pests	MOA Group No.	Timing
		, mealybugs		pinching.
Spirotetramat	Drench	Mites, whiteflies (B), mealybugs	23	Apply 2–3
Thiamethoxam	Foliar spray/drench	Whiteflies (B&Q), thrips	4A	Apply 1–2+ weeks after pinching. Use less than 8 oz/year. Rotate MOA.
Ultra Fine Oil	Foliar spray	Mites, mealybugs, whiteflies (B&Q), thrips	UN	Apply every 2–3 weeks. Do not apply after bract formation. Do not use with methiocarb.

Note. Information on the MOA Group No. can be found on the IRAC website (https://irac-online.org/mode-of-action/).

Poinsettia Disease Management

Several diseases, including scab, botrytis, root and stem rot, and bacterial canker, are often seen on poinsettia plants. Most soil-borne diseases can be managed by appropriate irrigation management. Similarly, when symptoms are identified, the infected plant parts need to be discarded immediately to avoid further infection.

More Poinsettia Resources

Find more information about new cultivars using these resources.

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