

Getting Started with Greenhouse Ornamental Production

Kelly Bryan, Savannah L. Columbia, Jonathan Larson, Qinglu Ying

Introduction

Greenhouse ornamental crops are an important part of Kentucky's horticulture industry. These crops supply small grower garden centers, local farmers markets, landscapers, and direct sales across the Commonwealth. Bedding plants, hanging baskets, holiday crops, foliage plants, and herbaceous perennials provide growers with a high-value product and opportunities for income, especially in the field crops off seasons. Growing greenhouse ornamental crops successfully in Kentucky depends on the understanding of plant specific practices, timing, and proactive pest and disease management.

Below, the publication introduces the fundamentals of greenhouse ornamental production for new and expanding growers in Kentucky. This publication will also provide practical recommendations and market trends tailored to the Commonwealth.

Crop Categories and Characteristics

Greenhouse ornamental crops include several groups, including bedding plants, flowering potted plants, foliage plants and herbaceous perennials, each with unique timelines and growing needs.

Bedding Plants

Bedding plants are fast growing annuals and perennials that are typically sold in packs or small (4-6 inches in diameter) pots for seasonal planting. They may also be sold in hanging baskets or deck pots. These crops include petunia, marigold, pansy, impatiens, vinca, coleus, begonia, etc. Bedding plants have a short production cycle (4-8 weeks) helping with high turnover and the spring demand. This category does require tight scheduling to have uniform growth among the plant varieties. These plants may be used for landscaping around buildings directly in the soil or in a soilless substrate such as a hanging basket or deck pot.

Flowering Potted Plants

Flowering potted plants are decorative crops grown and sold in bloom for holidays, gifts and other seasonal market opportunities. Common examples include poinsettia for winter holidays, Easter lilies for spring, and chrysanthemum for fall. Other flowering potted crops, such as petunia, marigold, pansy, geranium, lantana, begonia, fuchsia are commonly grown for spring and early summer holidays and events, including Mother's Day, Memorial Day, as well as for birthdays and other gift-giving occasions. Production of these crops is

often timed to meet specific market windows, allowing growers to sell plants at a higher value when consumer demand is greatest. Depending on the crop and market, they may be planted and sold in individual pots, typically 8-12 inches in diameter, hanging baskets, or larger decorative containers. Most flowering potted plants require approximately 8-16 weeks from transplanting to market, while certain crops, such as orchids, may require substantially longer production periods to reach marketable size and flowering stage.

Foliage Plants

Foliage plants are primarily grown for their leaves and overall appearance rather than flowers. These plants include philodendron, pothos, ferns, snake plant, succulents, etc. This category of plants has a slower growth cycle, with many common crops requiring approximately 3-12 months from young plants to marketable size resulting in higher overhead costs, and labor, as well as lower turnover rates, and slower cash flow. However, these plants are well adapted to indoor conditions and are commonly marketed as houseplants. This offers opportunities for year-round production and sales, rather than being limited to specific holiday or seasonal market windows. Growing consumer interest in houseplants has also created continued opportunities for growers in this market.

Herbaceous Perennials

Herbaceous perennials are plants that grow back each year from their root system after dying back or becoming dormant during the winter. Examples of herbaceous perennials include hosta, black-eyed Susan, coneflower, salvia, lavender, and daylily. These plants are often used in landscapes due to their winter hardiness, attractive foliage, and long-lasting blooms. Herbaceous perennials are often grown in quart containers, 1-gallon pots, or large decorative containers. The container sizing depends on the crop and desired finished size. Many perennials have a relatively long production cycle and may require overwintering before reaching marketable size. As a result, production may require greenhouse or protected growing space across multiple seasons. However, their perennial nature and broad use in landscapes provide opportunities for repeat and year-round sales, especially through landscape contractors and garden centers.

Table 1: Common greenhouse ornamental plant categories, representative crop examples, typical container sizes, approximate production times, and peak sales seasons.

Plant Category	Examples	Container Size	Production Time	Peak Sale Season
Bedding Plant	Petunia, Marigold, Pansy, Begonia	Cell Packs, 3-6-inch Pots, Hanging Baskets	4-8 Weeks	Spring

Flowering Potted Plants	Poinsettia, Easter Lily, Chrysanthemum, Geranium	4–12-inch Pots, Hanging Baskets	8-16+ Weeks	Holidays, Mother's Day, Fall
Foliage Plants	Pothos, Philodendron, Snake Plant	4–10-inch Pots	12-20+ Weeks	Year-round
Herbaceous Perennials	Hosta, Coneflower, Black-Eyed Susan, Salvia	Quart Pots, 1-Gallon Pots, Larger Containers	8-16+ Weeks; Some require overwintering	Spring or Fall

Figure 1: Greenhouse production of ornamental crops, including bedding plants, flowering potted plants, and hanging baskets at various stages of production.



Propagation and Starting Material

To begin the season, it is very important to start with healthy, uniform plant materials, as well as clean and sanitized equipment. The first step to beginning the season is to determine what propagation method works best for the grower. There are two different types of propagation methods: sexual and asexual propagation.

Sexual propagation is the production of plants from seeds. Many vegetable crops are commonly propagated from seeds, while fewer ornamental crops are produced this way. When starting the ornamental plants with seeds, it is important to determine if direct sowing or indirect sowing is most appropriate. Direct sowing is seeding directly into the container where plant will be grown to market size. Direct sowing is typically more time efficient but works best if seeds are bigger in size. Indirect sowing is when the seeds are started in one container, then transplanted to their final containers later. This method is

often preferred for small-seeded crops, such as begonias, because it provides better control over the early stage of plant development.

Asexual propagation is starting plants using plant parts rather than seeds. Common methods include cuttings, layering, division, separation, or grafting. Asexual propagation is widely used in ornamental production because it allows growers to produce uniform plants that maintain the desirable characteristics of the parent plant. Unrooted or rooted cuttings can be purchased from reputable commercial propagator or from local growers.

Purchasing young plants can reduce production time and labor while also reducing the need to maintain stock plants year-round.

Growers could also maintain stock plants and conduct propagation on-site. However, before taking cuttings, growers should verify that the cultivar can legally be propagated. Some ornamental cultivars are protected by plant patents, Plant Variety Protection (PVP), or other intellectual property rights, and unauthorized propagation may be prohibited. Licensed cultivars may also require the payment of a royalty or licensing fee for each plant produced. Check the plant tag, supplier information, or licensing terms before propagating a cultivar. When propagation is permitted, use clean and sanitized pruning shears to collect healthy plant material, typically making the cut near a node. Cuttings can be rooted in water or directly in an appropriate propagation medium. For cuttings rooted in media, a rooting hormone may help promote and accelerate root development for some crops. Maintaining healthy stock plants and clean equipment is also important for reducing the risk of spreading pests and diseases during propagation.

Figure 2: Foliage plant cuttings at various stages of production, showing the production of new plants from cuttings.



Figure 3: Ornamental plant cuttings rooted in water as a method of asexual propagation.



Best Practices for Propagation

To reduce the risk of pests and diseases, use clean trays, benches, and tools throughout the propagation. If reusing trays, be sure to clean and sanitize them before each use. During the propagation stage, maintain adequate humidity for the seeds, cuttings, or plugs. Gently mist the cuttings, or cover the trays with a humidity dome to help maintain the high humidity needed for early rooting. The frequency and duration of misting depends on the crop, greenhouse condition, and root stage. Newly inserted cuttings often require more misting, while misting can be gradually reduced as root develop and plants establish. It is important to avoid overwatering or excessive moisture to decrease disease pressure and delay root development. When planning for the season, careful scheduling ensures plants reach market stage at the correct time, especially for spring and holiday sales.

Table 2: Recommended handling practices and production considerations for common ornamental crops purchased as plugs or cuttings.

Crop	Purchased As	Handling	Considerations
Petunia	Plug or Cutting	Pot immediately or within 1-2 days	Keep moist Avoid stretching under low light
Begonia	Plug	Pot within 1-2 days	Handle carefully Avoid over watering
Geranium	Cuttings: Rooted and Unrooted	Pot within 1-2 days Root for 2-4 weeks	High humidity Rooting hormone

Poinsettia	Cutting: Rooted	Pot immediately	Warm temperatures
Chrysanthemum	Cuttings: Rooted	Pot immediately	Pinching may be needed

Figure 4: Petunia plugs being transplanted into individual containers.



Growing Media

Most greenhouse ornamentals are grown in soilless substrates that provide consistent moisture, drainage, aeration. The most common media components are peat moss, pine bark, coconut coir, and perlite. When looking for the best growing media, it is important to find one that drains well, holds moisture evenly, and has proper pH (generally between 5.5 and 6.5). Pore space in soilless substrates is the volume available for air and water. The goal is to keep balanced proportion of macro/micropores for good water retention and draining properties.

Containers

Containers play a vital role in plant growth, spacing, water management and overall appearance at the time of sale. Choosing the right container is essential, but it depends on the type of crop, production time, and intended market. Choosing the right container size helps prevent plant stress and the overall quality. Different ornamental crop categories often require different sizes of containers (Table 1).

Bedding plants are typically grown in cell packs or smaller pots (3-4inch) due to their short production times. Flowering potted plants such as geraniums, begonias, and petunias may be grown in 4–6-inch pots, depending on the finishing size goal. Foliage plants are often grown in 4-8 inch pots, but they may require being transplanted into bigger pots as they grow. Larger pots (8-12 inch), hanging baskets (8+ inches) and decorative containers are

commonly used for more mature plants or combination planters. The bigger containers allow more root growth, perfect for multiple plants in one container.

Container size also affects water management. Larger containers hold more media and generally retain moisture longer, while smaller containers dry out faster requiring more frequent watering. Regardless of the container size, proper drainage is imperative to prevent root diseases. If containers are reused, they should always be cleaned and sanitized before planting to reduce the risk of pests and diseases.

Figure 5: Finished hanging baskets and deck pots grown, showing common production and marketing formats for greenhouse ornamentals.



Water and Fertility Management

Proper irrigation and nutrition management directly impact plant quality. Plants should be watered thoroughly, but media should not be waterlogged. Allowing the media to dry slightly between irrigations can help reduce plant and root diseases. Another way to reduce the risk of diseases is to water early in the day and later in the evening. It is best to water the plant directly in the media to reduce disturbance to the leaves and foliage. Most ornamental crops require consistent fertilization to maintain healthy growth and appearance. Fertilization is commonly done through liquid feed or by controlled-release

fertilizers. Each ornamental species has a different fertilizer requirement. Understanding if the crop is a light, moderate, or heavy feeder can help develop the best fertilizer practice. Frequent testing of pH and electrical conductivity (EC) is essential to help identify and correct issues before they become severe. More detailed information on fertilization programs and recommendations can be found in additional publications listed at the end.

Table 3: General fertility groups for common greenhouse ornamental crops, including relative fertility requirements and representative crops commonly grown in Kentucky.

Fertility Group	Description	Kentucky Examples
Light Feeders	Lower fertility rates	Begonia, Impatiens, Ferns
Moderate Feeders	Moderate fertility rates	Petunia, Geranium, Pansy, Coleus
Heavy Feeders	Higher fertility rates	Chrysanthemum, Easter Lily, Poinsettia

Table 4: Substrate pH preferences of common greenhouse ornamental crops grouped by iron-use efficiency and their expected response to high substrate pH.

Group	Recommended pH	Kentucky Examples	Response if pH is Too High
Iron Inefficient	5.4-5.8	Petunia, Calibrachoa, Bacopa	Iron Deficiency
General	5.8-6.2	Geranium, Begonia, Marigold, Coleus	Moderate Sensitivity
Iron Efficient	6.0-6.6	Pansy, Viola, Impatiens	Tolerate of higher pH

Figure 6: Petunia showing symptoms consistent with iron deficiency, characterized by yellowing of the younger leaves while the leaf veins remain green.



Crop Growth and Management

Most consumers prefer their ornamental plants to be compact, full, and uniform. To achieve this, it is essential to provide enough light, space, encourage branching, and monitor the greenhouse climate to help control growth. Providing the right amount of light helps promote strong stems and better flowering, while low light conditions often lead to stretching, stringy, and weak growth. Photoperiods, the daily duration of light exposure, can affect flowering in ornamental crops. Ornamentals can be categorized as long-day, short-day, or day-neutral plants. These categorizes are based on how the plant responds to the length of day. Understanding the photoperiod requirements of a crop helps to schedule plants for each sale period.

Encouraging branching of the plant is commonly done by pinching or trimming the leaves and blooms, creating a fuller plant. Plants that often require pinching include but limited to, petunias, calibrachoa, coleus, chrysanthemums. However, some new varieties are bred to branch naturally, reducing the need for pinching, saving time and labor. As plants grow, spacing may need to be adjusted to prevent crowding. Spacing is important for vining plants such as petunias, and plants in hanging baskets, to reduce the risk of growing together. Plants that are growing too close together may not have room for proper air circulation. The plants may also become uneven and stretch for more light, causing them

to be less desirable for sale. Regular monitoring and small adjustments throughout the growing process can help maintain proper plant quality, making a more marketable crop.

Table 5: Common Greenhouse Ornamentals Grouped by Their Response to Photoperiod

Photoperiod Group	Flower Exposure	Common Ornamental Examples
Long-day Plants	Longer Days (Late Spring through Summer)	Petunia, Snapdragon, Salvia
Short-day Plants	Shorter Days (Late Fall through Winter)	Chrysanthemum, Poinsettia
Day-neutral Plants	Not affected by day length (Spring and Fall Equinoxes)	Geranium, Impatiens, Marigold

Figure 7: Young ornamental plants established in large containers for production as mature container-grown plants.



Figure 8: Greenhouse production area showing hanging baskets, container-grown plants, propagation materials, and bench space used for ornamental crop production.



Pest Management

All of the benefits greenhouses afford to plants growing inside of them are also offered to arthropods that could potentially become pests. Insects and mites that are pests often have short life cycles compared to other arthropods, in a greenhouse these short life cycles are sped up even further and there can be more generations of pests per year.

Greenhouses also often feature monocultures that pests can infest and find plenty of food and egg laying sites.

To manage pest insects and mites in greenhouses, they must be monitored for. If pest populations are caught in their earliest stages, they are easy to manage and there will be less damage. When reacting to high pest populations management is more difficult and often has to rely on heavier duty pesticides in order to be successful. Monitoring in a greenhouse relies on both active and passive methods. For active monitoring, this entails visual inspection of plants for common symptoms, as well as for visible populations of pests. It is helpful to have a hand lens or magnifying glass to help with visibility. Inspecting doesn't have to be comprehensive for every plant in the greenhouse. Managers should create a scouting plan, this could be to inspect the first, middle, and final plant in each column of plants on benches or to inspect every fifth plant in a section. Be sure to look at the tops and bottoms of leaves, in blooms, and up and down the stem. Passive monitoring in greenhouses usually relies on the use of sticky card traps. Sticky cards are coated in glue on both sides and come in yellow or blue. Yellow cards are more commonly used as they attract many different types of pests, blue tends to be used for thrips monitoring. While the

cards do trap and kill insects, they are not used for management but to track pests entering or moving around the greenhouse. There is usually one card used for every 1,000 square feet, then additional cards near doors, vents, and along the edge of the greenhouse. For more intensive monitoring, they can be placed at the beginning, middle, and end of tables or columns/rows of plants. The cards should always be at the tops of plants, to be able to adjust them as the plant grows, some growers clip them to poles using clothespins or use specialized wire holders sold by retailers. The cards would ideally be collected and then inspected once a week, though 10-14 days can also be acceptable. The results of inspections and card counts should be recorded and used to build a predictive calendar for your greenhouse after years of results.

Table 6: Common insect and mite pests of greenhouse ornamental crops, including representative host plants and symptoms that can help growers identify pest infestations.

Pest	Common hosts	Symptoms
Aphids	Can infest nearly any commonly grown greenhouse plant; chrysanthemum, dahlia, gerbera daisy, marigolds, salvia, snapdragon, zinnia	Cupped and curled leaves, shiny honeydew on leaves and surfaces, black sooty mold growing in honeydew, “dusty” plants- covered in spent exoskeletons, ants visiting infested plants
Cyclamen mites	African violets, cyclamen, dahlia, gloxinia, snapdragon, geranium, chrysanthemum, larkspur, begonia, fuchsia, petunia, and New Guinea impatiens	Usually found in fall/winter, distorted leaves that curl inward, foliage may become blotchy or streaky, may also have purplish areas
Fungus gnats	Found in the soil media of any potted plant or moist growing media	Associated with overly wet soil or potting media, seedling may appear stunted, lack vigor, and appear wilted, adults are slow and obvious on soil or pots
Mealybugs	coleus, croton, fuchsia, gardenia, hibiscus, orchids, and succulents.	Leaf yellowing, stunted leaves, honeydew, black sooty mold growing in honeydew, ants collecting honeydew, white “cotton ball” patches on plants

Spider mites	Feed on over 300 species of ornamental plants, common hosts include impatiens, hydrangea, marigolds, and poinsettias	More common in hotter months, leaves will appear stippled and then dull and off color, thin patches of webbing may also be seen
Thrips	Thrips can be found on hundreds of species of ornamental plants; cyclamen, ferns, impatiens, fuchsia, chrysanthemum, marigolds, and petunia	Silver flecking damage on flowers, distorted leaves that appear bleached, plant disease outbreaks, black fecal spots
Whiteflies	Hundreds of possible hosts; chrysanthemum, petunia, impatiens, geranium, and coleus	Leaf yellowing, dieback and leaf drop, shiny honeydew accumulations, black sooty mold infestations

Marketing and Sales

Successful ornamental production requires aligning crop cycles with peak seasonal demand and multichannel direct-to-consumer or wholesale marketing strategies. Peak seasonal demand occurs during the spring and early summer months and is driven by home gardening, landscape projects, and Mother's Day. Adverse weather during this time may negatively affect sales. Additionally, a secondary demand peak occurs in early fall driven by cool-weather planting and perennial establishment.

Potential direct-to-consumer market channels include on-site retail, farmers markets, and pre-ordering online for on-farm pickup. Direct-to-consumer sales allow growers to retain higher sales margins. Growers interested in direct sales should maintain active social media channels demonstrating plant care, repotting, or home styling, while promoting their farm's authenticity, sustainability, and local growing practices to connect with core consumer values. Social media channels should also communicate how and when consumers can purchase from the farm. If using an online ordering form, be sure to include explicit directions for payment and pickup to set clear expectations for the consumer. When facilitating on-site retail sales, clearly communicate product pricing, parking and directions, and farm branding – this can be done through signage.

Potential wholesale markets include local garden centers, Kentucky's produce auctions, and landscape contractors. These buyers often purchase in bulk. Securing agreements early with local garden centers and landscape contractors is ideal, and they may serve as repeat buyers year after year if they are satisfied with the product and relationship terms. Regardless of which market channel is chosen, it's critical to pay attention to your buyer's needs. These needs can change over time. For example, over the past two decades, there has been a preference given by landscapers and garden center customers towards bedding plants in 4-6-inch pots and larger containers, as they provide an instant and immediate appeal in home and commercial landscapes. Additionally, hanging baskets and patio pots appeal to garden center consumers with limited landscaping space.

Economic Considerations

Annual bedding and garden plants represent the largest category of floriculture industry sales, totaling \$2.67 billion in 2024 – this is a 19% increase in sales from 2019, according to the USDA. Potted flowering plants totaled \$1.29 billion in sales (up 7% from 2019), and potted herbaceous perennials totaled \$1.36 billion (up 47% from 2019) in 2024, according to the USDA. While these increases in sales (compared to 2019) are positive, ornamental production has significant start-up and management costs to consider, such as infrastructure, seeds, growing media, containers, and labor.

Bedding plants and flowering plants can gross up to \$20 per square foot per year, with an estimated cost of production ranging from \$5 to \$7 per square foot of greenhouse space. Similarly, foliage plants can gross up to \$20 per square foot per year, with an estimated cost of production ranging from \$2 to \$7 per square foot of greenhouse/shade house space. Herbaceous perennials can gross \$4.00 to \$15.00 per one-gallon container (depending on wholesale or retail pricing structure), with an estimated cost of production ranging from \$2.00 to \$4.50 per one-gallon container. Profitability can vary depending on crop selection, infrastructure size, production system, and marketing strategy; therefore, growers should develop production cost estimates specific to their situation. It is recommended that growers maintain a gross margin of 30% to 40% $[(\text{Total Sales} - \text{Total Direct Costs}) / \text{Total Sales}]$ and a profit margin of 10% to 15% $(\text{Net Income} / \text{Total Sales})$ to be sustainable in the industry, as noted in HortScience.

Figure 9: Ornamental plants displayed for direct-to-consumer sale, demonstrating a seasonal retail marketing opportunity for greenhouse growers.



Figure 10: Ornamental plants displayed for direct-to-consumer sale, demonstrating a seasonal retail marketing opportunity for greenhouse growers.



Conclusion

Greenhouse ornamental production can be a profitable option for Kentucky growers. The success of production depends on starting with healthy plants, maintaining proper growing conditions, and timing the crops for market demands. Careful attention to details such as watering, fertility, spacing, and pest management can make a significant difference in overall plant quality and profitability.

Additional Resources

United States Department of Agriculture National Agricultural Statistics Service. (2026, February 26). U.S. Horticulture Operations Report \$18.3 Billion in Sales [News Release]. <https://www.nass.usda.gov/Newsroom/2026/02-26-2026.php>

Texas A&M AgriLife Extension. Bedding Plants Crop Guide. <https://aggie-horticulture.tamu.edu/smallacreage/crops-guides/greenhouse-nursery/bedding-plants/>

Texas A&M AgriLife Extension. Flowering Plants Crop Guide. <https://aggie-horticulture.tamu.edu/smallacreage/crops-guides/greenhouse-nursery/flowering-plants/>

Kaiser, C. and M. Ernst. (2019). Bedding Plants. CCD-CP-56. Lexington, KY: Center for Crop Diversification, University of Kentucky College of Agriculture, Food and Environment. <https://ccd.uky.edu/resources/crops/nursery-ornamental/bedding-plants>

Texas A&M AgriLife Extension. Foliage Plants Crop Guide. <https://aggie-horticulture.tamu.edu/smallacreage/crops-guides/greenhouse-nursery/foliage-plants/>

Wei, X., Khachatryan, H., & Rihn, A. (2020). Production Costs and Profitability for Selected Greenhouse Grown Annual and Perennial Crops: Partial Enterprise Budgeting and Sensitivity Analysis. *HortScience*, 55(5), 637–646. <https://doi.org/10.21273/HORTSCI14633-19>.

University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), University of Kentucky, and Texas A&M University. 2023. *PropG: Plant Propagation Glossary*. <https://propg.ifas.ufl.edu/index.html>

North Carolina State University Cooperative Extension. *Extension Gardener Handbook: Chapter 13—Propagation*. NC State Extension Publications. NC State Extension Gardener Handbook: Propagation

Kaiser, C., and M. Ernst. (2020). *Hanging Baskets*. CCD-CP-59. Lexington, KY: Center for Crop Diversification, University of Kentucky College of Agriculture, Food and Environment.

Kaiser, C., and M. Ernst. (2019). *Bedding Plants*. CCD-CP-56. Lexington, KY: Center for Crop Diversification, University of Kentucky College of Agriculture, Food and Environment.

Byrd, C., Ying, Q., and Sharma, A. (2025). *Monitoring pH and EC in Greenhouse Production*. CCD-TA-01. Lexington, KY: Center for Crop Diversification, University of Kentucky Martin-Gatton College of Agriculture, Food and Environment.

University of Kentucky Center for Crop Diversification. (2025). *Selecting Growing Media for Soilless Systems*. CCD-ER-02. Lexington, KY: University of Kentucky Martin-Gatton College of Agriculture, Food and Environment.

North Carolina State University Cooperative Extension. 18. Plants Grown in Containers. Extension Gardener Handbook. North Carolina State University. <https://content.ces.ncsu.edu/extension-gardener-handbook/18-plants-grown-in-containers>

Kime, L. (2025). *Greenhouse Production*. Penn State Extension. The Pennsylvania State University. <https://extension.psu.edu/greenhouse-production>

Pennsylvania State University Extension. (2026). *Timepieces in Our Plants*. Penn State Extension. <https://extension.psu.edu/timepieces-in-our-plants>