

Unit VII: Greenhouse Business Management

Lesson 1: Commercial Greenhouse Crops

This unit explains why planning a commercial greenhouse crop and developing a marketing plan are essential to greenhouse business management. Lesson 1 begins with an exploration of why specific crops are selected for production, justifies why a growing schedule is important, and summarizes the costs of producing crops. Next, the lesson explains how crops are evaluated and cared for after harvest and during marketing.

Selecting Commercial Crops

One of a greenhouse owner's most important responsibilities is selecting commercial crops that can increase profits. This decision is derived from the results of a market analysis that identifies the types of plants that customers want to purchase. (Lesson 2 describes how market research is conducted.) Visiting retail and wholesale operations, local nurseries, and landscaping outlets gives the owner a sense of what is popular. Profitability is a key concern. If a plant costs too much to produce (or if it is available elsewhere for less), the greenhouse owner probably would not select it.

Another way to discern the types, sizes, and amounts of plants the public wants is to read trade journals such as *Greenhouse Manager*, *Greenhouse Grower*, and *Grower Talks* and popular magazines (e.g., *Midwest Living*, *Better Homes and Gardens*, and *House Beautiful*). The greenhouse owner must also consider whether the staff can perform specific propagation techniques required for a new crop.

University Extension offices, state and federal agricultural agencies, and Internet sites provide data that can help the greenhouse owner determine which crops to grow.

Table 7.1 displays the wholesale value of Missouri crops that grossed \$100,000 or more in 1999. Each of these crops is discussed below.

Table 7.1 - Missouri's Commercial Floriculture Crops

Crop	Wholesale Value	Percent of Total
Cut Flowers	\$ 281,000	0.8
Foliage Plants	2,192,000	6.4
Potted Flowering Plants	11,711,000	34.2
Bedding and Garden Plants	20,085,000	58.6
TOTAL	\$34,269,000	100%

Even though cut flowers represent the lowest percent of total sales, many retailers sell them in floral shops, malls, and grocery stores. The public frequently buys cut flowers for special occasions, such as roses on Valentine's Day, or just to brighten a room. In Missouri, the favorite cut flowers on the market are chrysanthemums, daffodils, gladioli, iris, narcissus, roses, snapdragons, tulips, and zinnias.

A greenhouse owner may choose to grow foliage plants because numerous species and cultivars are available, many of which are produced year-round. Potted foliage and foliar hanging baskets are the most popular in Missouri.

Some potted flowering plants, such as poinsettias and Easter lilies, are cultivated for special times of the year. Missouri greenhouse owners also raise African violets, azaleas, chrysanthemums, cyclamens, and kalanchoes. Some these potted plants are produced throughout the year.

In Missouri, bedding and garden plants have the greatest sales potential, capturing nearly 59% of

Greenhouse Operation and Management

the total floriculture market in 1999. They are used for personal and commercial landscaping projects and are available for spring sales; some are sold during summer and fall. All-time favorites in Missouri include geraniums, hardy/garden chrysanthemums, impatiens (also New Guinea impatiens), petunias, and vegetable flats.

Determining Growing Schedule

Once the commercial crops are selected, the greenhouse owner develops a growing schedule to expedite production. It identifies when to plant each crop and perform cultural practices such as fertilization, irrigation, application of pesticides, and propagation. Aeration, drainage, day-length treatment, and date of harvest are noted as well. Postharvest procedures are also cited. Referring to cultural records enables the greenhouse owner to reproduce successful crops because potential problems are isolated before they have the chance to intensify and threaten the crops.

The growing schedule reflects when to check environmental conditions, namely, temperature, amount of light exposure, and moisture and humidity levels. Other pertinent conditions noted on the schedule include the types of growing media used, nutrient and foliar analysis, and an indication of whether diseases and pests are evident on the crops. Tracking these factors helps the greenhouse owner assess production costs, recognize nutritional deficiencies, and maintain healthy plants.

Management practices are also listed, such as dates for ordering/reordering supplies, shipping, and billing.

An important feature of a growing schedule is a crop rotation plan that helps organize the allocation of bench space throughout the year. An efficiently run greenhouse optimizes the number of planting benches and the space between plants. By knowing how much production time and space

a crop requires for growth, the owner can maximize the planting cycles in the greenhouse and gain higher yields and profit. Plants should be spaced very close together when they are first transplanted, and then as they develop, they need more room between the pots. A crop rotation plan can also calculate the production time and space required per crop (as measured in square feet weeks).

- Determine how many square inches there are per flat. (Multiply the dimensions of the flat.)
- Convert square inches to square feet by dividing the total number of square inches in the flat by 144 (the total number of square inches per square foot). The result is the amount of bench space per flat in square feet.
- Multiply the amount of bench space in square feet by the number of weeks required to grow the plant.
- The result is the amount of bench space required as measured in square foot weeks.

Here's an example: A coleus flat is 12 x 24 in. and it takes 6 weeks to grow.

- (1) 12 in. X 24 in. = 288 sq in.
- (2) Convert square inches into square feet. (1 sq ft = 12 X 12 in. [144 sq in.])
- (3) Divide the total number of square inches in the coleus flat by 144 sq in. (1 sq ft)
- (4) $288/144 = 2$ sq ft (amount of bench space per flat)
- (5) $2 \text{ sq ft} \times 6 \text{ weeks} = 12 \text{ sq ft weeks}$ (amount of bench space required in square foot weeks)

Finally, the growing schedule names the person who is responsible for performing each task and notes when the task is completed. This provides

accountability and quality control for crop production.

Analyzing Expenses

All commercial enterprises incur two types of expenses: fixed and variable. Fixed (ownership) costs are paid regularly, regardless of the amount of sales. The major categories of fixed costs are depreciation, interest, repairs and shelter, taxes, and insurance. Applied specifically to greenhouse operations, fixed costs include the depreciation of greenhouse structures and equipment; interest on the land and building(s); repair expenses to maintain greenhouse structures, equipment, etc.; taxes on property; and insurance for employees and the greenhouse operation.

Variable (operating) costs change according to production level and amount of use. The major categories include labor (salaries), fertilizer, chemicals, seed, gasoline and oil, inventory, supplies, advertising, utilities, telephone, principal payment. When operating a greenhouse business, variable costs include labor (seasonal and full-time employees); fertilizer, rooting and growing media, and chemicals; seeds and plants; fuel for heating the greenhouse; inventory of growing and packing supplies (media, containers, and labels); advertising and display expenses; utilities, water, and telephone.

A cost analysis calculates the profit and loss of the operation and indicates the net return. A cost analysis statement records the amount of all variable expenses (designated directly to a specific crop) and the income received from all crops. For fixed expenses, a cost analysis provides the average weekly cost per square foot of bench space (including used and vacant benches). The formula is as follows:

Total fixed costs/52 (number of weeks per year)/sq ft bench space = average cost per week per square foot

For example, if the operation's total fixed costs are \$15,000 and the total bench space is 20,000 sq ft, here is how to calculate the cost:

- (1) $\$15,000/52 = \288.46 per week
- (2) $\$288.46/20,000 \text{ sq ft} = \0.014 per week per square foot

Evaluating the Commercial Crop

The greenhouse owner evaluates the quality of commercial crops before selling them to customers. Every plant must display adequate nutrients and fertilization for optimal growth and have sufficient water, aeration, and drainage.

Plants should have no yellow, broken, or dying leaves and must be free of insect damage. To appeal to customers, each container must be neat and clean and include a tag that describes how to care for the plant at home. Finally, potted plants are usually wrapped in attractive foil and displayed in a convenient location.

Caring for Commercial Plants After Harvest and During Marketing

After harvest, commercial crops require special care to ensure their ability to withstand stress and survive longer. Maintaining moisture is essential. The relative humidity must be kept at optimal levels. To offset water depletion during refrigeration, the storage area must be humidified. Keeping harvested plants away from direct heat and sunlight also protects them from moisture loss. Excessive heat harms the roots and leaves and dries out the growing media.

Regulating the respiration rate affects how well plants survive after harvest and during shipping. As the plants' food supply diminishes during respiration, crops deteriorate. Because high temperatures raise respiration, plants must be kept cool to reduce respiration, inhibit wilting, slow down metabolism, and hinder growth of mold and

Greenhouse Operation and Management

bacteria. Cool temperatures also lessen the production of ethylene, which is a gas that hastens ripening. Air circulation lowers temperature and reduces ethylene concentration.

To stay fresh, cut flowers must build up their strength with enough carbohydrates. The greenhouse owner can maintain the quality of this crop by supplying the right amount of light and cutting the plants late in the day. The “vase life” of cut flowers is compromised if the following circumstances occur: the stems are blocked and cannot absorb water, excessive moisture escapes from the flowers, or respiration is suppressed because of insufficient carbohydrates. To extend the vase life of cut flowers, several commercial preservatives are available that consist of carbohydrates, bactericide, and an acidifier. The salesperson usually attaches a complimentary package of the floral preservative when a customer purchases a bouquet of cut flowers.

Foliage, potted flowering plants, and bedding and garden plants also need sufficient amounts of carbohydrates to sustain their strength. To increase plants’ shelf life, the greenhouse owner lowers the temperature, reduces the amount of water, and decreases the amount of nutrients. Green plants receive less light. These procedures “harden” the plants, enabling them to adjust to new environments outside the protection of the greenhouse.

All crops should be handled gently and not touched more than necessary. Putting plants in protective containers with the appropriate amount of growing media keeps them secure. When loading plants onto trucks/vans for shipping, they should be secured in boxes and pallets.

During marketing, the storage and display areas should be kept cool. Every plant has a specific temperature at which its foliage, size, and overall condition remain optimal. But for every 18°F increase above that temperature, quality deteriorates. Plants also need the correct amount

of light and shade. If bedding plants are kept out of direct sun, the flowers maintain color and moisture is maintained. Only very small amounts of fertilizer are needed, if any. Watering is required only when crops exhibit stress. Placing plants on benches promotes air circulation, keeps them dry, and prevents soilborne diseases. And customers appreciate having easy access to elevated plants. Finally, a clean marketing area is not only conducive to pleasant shopping, it also limits ethylene production that results from decaying plants.

Summary

Planning a commercial crop begins with the selection of plants that will attract customers and promote sales. The greenhouse owner considers the sales potential of cut flowers, foliage, potted flowering plants, and bedding/garden plants. Once the selection process is complete, a growing schedule establishes when various cultural, environmental, and management practices should occur. The greenhouse owner must consider fixed and variable costs and prepare a cost analysis to determine the profit and loss of the operation. After the commercial crop is harvested, the owner evaluates the quality of each plant. Plants need special care after harvest and during marketing.

Credits

Ball, Vic, Editor. *Ball Red Book Greenhouse Growing*, 14th ed., Reston, VA: Reston Publishing Company, Inc., 1985.

Biernbaum, John A. “Greenhouse Crop Production: Counting the Costs and Making Cents.” Michigan State University.
<http://www.hrt.msu.edu/HortLinks/pdf_files/Production_Costs_Article.pdf> accessed 3/19/02.

“Greenhouse Management - Postproduction Quality.” <<http://www.sfasu.edu/ag/horticulture/hrt321/14.%20HRT%20321%20Post%20Production%20Quality.htm>> accessed 1/4/02.

Greenhouse Operation and Management (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1990.

“Greenhouse Production.” West Virginia University Extension Service. Adapted from Fact Sheet 593, University of Maryland, Cooperative Extensive Service. <<http://www.wvu.edu/~agexten/hortcult/greenhou/gnhssite.htm>> accessed 3/15/02.

Kessler, J.R. “Growing and Marketing Bedding Plants.” Alabama Cooperative Extension System. ANR-559, Revised Aug. 1999. <<http://www.aces.edu/departments/extcomm/publications/anr/anr-559/anr-559.html>> accessed 12/21/01.

Kessler, J.R. “Starting a Greenhouse Business.” Alabama Cooperative Extension System. ANR-691, Revised Oct. 1999. <<http://www.aces.edu/departments/extcomm/publications/anr/anr-691/anr-691.html>> accessed 3/22/02.

Lee, Jasper S., Series Editor. *Introduction to Horticulture*, 3rd ed., Danville, IL: Interstate Publishers, Inc., 2000.

“Missouri Fruit and Vegetable Growers Database Listing - Growers in Missouri.” University of Missouri Outreach & Extension. <<http://agebb.missouri.edu/hortgrow/searchre.asp>> accessed 3/14/02.

Nelson, Kenneth S. *Greenhouse Management for Flower and Plant Production*. Danville, IL: The Interstate Printers & Publishers, Inc., 1980.

Smith, Tina. “Caring for Plants in the Retail Setting.” University of Massachusetts Extension - Floriculture. <http://www.umass.edu/umext/programs/agro/floriculture/floral_facts/retail.htm> accessed 3/15/02.

Thomas Paul A. and William A. Thomas. “Starting a Greenhouse Business.” The University of Georgia College of Agricultural and Environmental Sciences Cooperative Extension Service. <<http://www.ces.uga.edu/pubcd/b1134-w.html>> accessed 3/14/02.

Wilson, L.G. et al. “Postharvest Handling and Cooling of Fresh Fruits, Vegetables, and Flowers for Small Farms. Part I: Quality Maintenance.” North Carolina A&T State University Cooperative Extension. Horticulture Information Leaflet 800. <<http://www.ces.ncsu.edu/depts/hort/hil/pdf/hil-800.pdf>> accessed 3/20/02.

Wilson, L.G. et al. “Postharvest Handling and Cooling of Fresh Fruits, Vegetables, and Flowers for Small Farms. Part II: Cooling.” North Carolina A&T State University Cooperative Extension. Horticulture Information Leaflet 801. <<http://www.ces.ncsu.edu/depts/hort/hil/pdf/hil-801.pdf>> accessed 3/20/02.

Wilson, L.G. et al. “Postharvest Handling and Cooling of Fresh Fruits, Vegetables, and Flowers for Small Farms. Part III: Handling.” North Carolina A&T State University Cooperative Extension. Horticulture Information Leaflet 802. <<http://www.ces.ncsu.edu/depts/hort/hil/pdf/hil-802.pdf>> accessed 3/20/02.

Wilson, L.G. et al. “Postharvest Handling and Cooling of Fresh Fruits, Vegetables, and Flowers for Small Farms. Part IV: Mixed Loads.” North Carolina A&T State University Cooperative Extension. Horticulture Information Leaflet 803. <<http://www.ces.ncsu.edu/depts/hort/hil/pdf/hil-803.pdf>> accessed 3/20/02.

