GREENHOUSE OPERATION AND MANAGEMENT

Unit I: The Greenhouse Industry

Lesson 1: Scope and Development of the Greenhouse Industry

Competency/Objective:

Identify the scope and development of the greenhouse industry.

Study Questions

- 1. What are the four areas of horticulture?
- 2. How has the greenhouse industry developed throughout history?
- 3. What are recent changes in the greenhouse industry?
- 4. What is the economic importance of the greenhouse industry?

References/Supplies/Materials

- 1. *Greenhouse Operation and Management* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2002.
- 2. Transparency Masters

TM 1.1 1999 Missouri Floriculture Crops TM 1.2 2000 U.S. Floriculture Crops TM 1.3 2000 U.S. Bedding and Garden Plant Sector

- 3. Activity Sheets
 - AS 1.1 Growing Possibilities AS 1.2 Investigating a New Product in the Greenhouse Industry AS 1.3 Global Greenhouses
- 4. Local Yellow Pages (several copies)
- "Floriculture Crops 2000 Summary." USDA National Agricultural Statistics Service, Agricultural Statistics Board, April 2001. http://usda.mannlib.cornell.edu/reports/nassr/other/zfc-bb/> accessed 2/21/02.

- 6. "Floriculture Crops." USDA National Agricultural Statistical Service. <http://www.usda.gov/nass/aggraphs/ws_tenyr.htm> accessed 2/20/02.
- 7. USDA National Agricultural Statistics Service. 1997 Census of Agriculture Census of Horticultural Specialties (1998) Volume 3, Special Studies, Part 2.
- 8. "Value of Sales at Wholesale." USDA National Agricultural Statistics Service, http://www/usda.gov/nass/aggraphs/val_type.htm> accessed 2/20/02.
- 9. Greenhouse Grower, Greenhouse Business, Grower Talks, Greenhouse Product News

Teaching Procedures

IMPORTANT NOTE: Please refer to the Suggested Time Frame for Teaching (page xxxv) and to Planning for Unit IV Activities (page xxxvii) for information about initiating four activities in selected lessons in Unit IV. It is recommended that preparation begin during Unit I, Lesson 1.

A. Introduction

This unit examines facets of the greenhouse industry and identifies available career opportunities. In this lesson students discover how greenhouse production relates to four divisions within the field of horticulture. Lesson 1 also describes the history, developments, and economic importance of the greenhouse industry. Be sure to note that there is a discussion of recording-keeping procedures in Unit VII, Lesson 2.

B. Motivation

Divide the class into cooperative groups and give each group a copy of the Yellow Pages. (Yellow Pages from neighboring communities also can be used for contrast.) Have students identify local growers who produce flowers, vegetables, landscaping supplies, etc. If possible, invite an owner/manager to class to discuss how his/her business has changed over the years and contributed to the local economy.

C. Assignment of Study Questions

Be sure the classroom has many different types of potted plants, in varying stages of development.

D. Supervised Study

Lead students in collecting the information needed to answer and discuss the study questions. Instructor may choose to work on one study question at a time or have students answer all the study questions before the discussion. Another option is to have students work in a cooperative learning environment and have groups work on different study questions.

E. Discussion

Lead students in a discussion of the study questions. Supplement students' responses and information with additional materials when needed.

1. What are the four areas of horticulture?

Ask students if they have ever heard the word "horticulture" and if so, in what context. Explain that its original meaning is derived from two words: "garden" and "cultivate." However, today horticulture is broadly defined as the cultivation of plants. Write "horticulture" on the board and ask students to name the types of plants that may be cultivated. Record and organize their responses into the four categories listed below. Point out that a greenhouse owner may produce crops from any of the four horticultural groups.

- A. Horticulture cultivation of plants and vegetables
- B. Floriculture flowers (cut flowers, bedding plants, foliage plants, potted plants)
- C. Olericulture vegetables
- D. Ornamental horticulture plants grown for their beauty (annuals, perennials, shrubs, ground cover, landscaping)
- E. Pomology fruit and nuts

2. How has the greenhouse industry developed throughout history?

Ask students to estimate when the first greenhouse was built. During the discussion, consider how environmental factors, transportation, building materials, and available markets have affected the growth and development of the greenhouse industry. Also remind the class how references to centuries relate to actual years. For example, the 16th century refers to 1500-1599.

- A. Roman emperor Tiberius (30 AD) built "specularia."
- B. In 13th century, Dominican monk Albertus Magnus tried to force blooms out of season.
- C. By 1599, the first practical greenhouse was built in Holland.
- D. "Orangeries" were constructed in France during the 17th century.
- E. Andrew Faneuil built the first U.S. greenhouse in 1737.
- F. During the 19th century in England, greenhouse construction developed most fully. By 1825, greenhouses were common.
- G. By 1950, improvements in transportation allowed growers to reach broader markets. New materials became available for constructing greenhouses.
- H. In 1960, greenhouses were made from film plastic and galvanized steel. Noteworthy botanical greenhouses were built during that decade: Missouri Botanical Garden (1960), Hamburg Botanic Gardens (Germany, 1963), and the Exhibition Plant Houses at Edinburgh (Scotland, 1967).
- I. By 1980, floriculturists in the Netherlands became renown for concentrating on specific or related crops, relying on automated production, and selling crops by the auction market system.

3. What are recent changes in the greenhouse industry?

Ask students who have had experience raising livestock or crops to identify advanced techniques or procedures used to promote efficient growth. Relate these developments to greenhouse-grown crops. Have students complete AS 1.1. Before students begin working on AS 1.2, talk about RootShield and PlantShield and explain how these products have helped greenhouse personnel produce healthy plants. If possible, apply one of these fungicides to a plant in the classroom that exhibits root disease. Encourage students to explore facets of the greenhouse industry that have developed over the years.

- A. Growing structures
- B. Coverings
- C. Equipment
- D. Growing methods
- E. Plant varieties (colors, forms, resistance to disease)
- F. Biotechnology

4. What is the economic importance of the greenhouse industry?

Engage students in a discussion about the economic importance of the greenhouse industry. Guide them to the discovery that this industry provides employment and income locally, nationally, and worldwide and that the greenhouse business has evolved over time. Remind the class of the businesses they identified during the Motivation. Ask them to name floriculture crops or greenhouse-grown vegetables that are produced in their community. How have these crops helped the local economy?

Display a map of the United States. Have students infer what types of crops are grown throughout the country. Point out the significance of regional differences in climate and environmental factors. Also display a globe or world map. Ask students to interpret the impact of the global greenhouse industry upon the United States and especially upon Missouri.

- A. Missouri 1999 statistics for wholesale floriculture production (TM 1.1)
 - 1. Value from growers grossing \$10,000 or more \$41.6 million
 - 2. Value from growers grossing \$100,000 or more \$34.3 million
 - 3. Bedding/garden plants and potted flowering plants major floriculture crops
 - 4. Compared nationwide based on combination of greenhouse sales, nurseries, landscaping outlets, etc.
 - a. 26th nationwide in floriculture production
 - b. 28th nationwide in ornamental horticulture production
 - c. 28th nationwide in pomology production
 - d. 31st nationwide in production of commercial vegetables
- B. United States
 - 1. In 2000, the wholesale value of floriculture production grossing \$100,000 or more in sales was nearly \$4.7 billion. See TM 1.2. Five states contributing the most to that amount are California (20%), Florida (18%), Michigan, Texas, and Ohio.

- 2. Bedding and garden plants production represents 50% of the wholesale value of all reported crops and is made up of the following crops: (TM 1.3)
 - a. Potted bedding and garden plants (48% of total)
 - b. Bedding and garden flats (42% of total)
 - c. Flowering hanging baskets (10% of total)
- 3. Potted flowering plants
 - a. 3% increase in production from 1999
 - b. California 18% of total sales
 - c. Top sellers poinsettias, orchids, azaleas, and chrysantheums
- 4. Foliage plant
 - a. 12% increased production from 1999
 - b. Florida 69% of total market
 - c. 85% of total sales potted foliage plants
- 5. Cut flowers
 - a. 1% decreased production from 1999
 - b. 23% drop in number of growers from 1999
 - c. California 67% of total market
 - d. Top sellers: roses, lilies, gladioli
- 6. Herbaceous perennials with hardy garden mums as 25% of this market
- 7. Propagative materials used to grow various types of plants; 44% of all propagative materials used for annual bedding and garden plants.
- 8. Cut greens
 - a. 2% decreased production from 1999
 - b. Florida 81% of total market
- C. World (major exporters) Have students complete AS 1.3.
 - 1. The Netherlands
 - a. Exports tulip flowers and bulbs
 - b. Is the international leader in floriculture enterprises.
 - 2. Central and South America (Mexico, Costa Rica, Colombia, and Brazil)
 - a. Favorable climate
 - b. Government-sponsored subsidies for the industry
 - c. Access to labor force
 - d. Produce cut flowers (e.g., roses and carnations), flower seeds, foliage plants
 - 3. Kenya, Africa floriculture producer since early 1970s
 - a. Flower producer (mainly roses) and seeds for geranium, petunia, and impatiens
 - b. Simple greenhouses; require no supplementary heat
 - c. Cheap, abundant labor
 - 4. Australia and New Zealand orchids
- F. Other Activities and Strategies
 - Show the class video(s) on growing plants in a greenhouse. Three videos are available from CATER (Career & Technical Education Resources), 2 London Hall, University of Missouri-Columbia: *How to Grow Plants in a Greenhouse: Bedding Plant Production*, Volume I (AG V162); *Foliage Plant Production*, Volume II (AG V163); *Potted Plant Production*, Volume III (AG V164).

- 2. Have students investigate how the auction market system operates in the Netherlands when selling greenhouse-grown crops.
- 3. Ask students to identify and summarize the contributions of famous plant scientists and researchers by searching the Internet and referring to science/history textbooks, magazines, and biographies, and other resources.
- G. Conclusion

Horticulture comprises four fields: floriculture, olericulture, ornamental horticulture, and pomology. For centuries, people have been interested in cultivating these types of plants. As building materials and means of transportation developed, the greenhouse industry has become increasingly sophisticated. The greenhouse industry has developed thanks to state-of-the-art equipment, improved coverings, and biotechnology. The greenhouse industry contributes employment and economic support to the state of Missouri, the United States, and several countries throughout the world.

- H. Answers to Activity Sheets
 - AS 1.1 Growing Possibilities

Instructor's discretion

AS 1.2 Investigating a New Product in the Greenhouse Industry

Instructor's discretion

AS 1.3 Global Greenhouses

Instructor's discretion

- I. Answers to Assessment
 - 1. C
 - 2. B
 - 3. D
 - 4. E
 - 5. A
 - 6. D
 - 7. A
 - 8. D
 - 9. C
 - 10. A
 - 11. D
 - 12. The student may list any three of the following:
 - A. Growing structures

- B. Coverings
- C. Equipment
- D. Growing methodsE. Plant varieties (colors, forms, resistant to disease)
- F. Biotechnology

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Lesson 1: Scope and Development of the Greenhouse Industry

ASSESSMENT

Date

Matching: The terms on the left-hand side refer to the cultivation of certain types of plants, which are listed on the right side. Write the correct letter in the space provided.

 1.	Floriculture	A.	fruits and nuts
 2.	Horticulture	B.	plants and vegetables
 3.	Olericulture	C.	flowers and foliage plants
 4.	Ornamental horticulture	D.	vegetables
 5.	Pomology	E.	shrubs and other plants for landscaping

Multiple Choice: Circle the letter of the best answer.

- 6. When and where did greenhouse construction develop completely and become common?
 - A. 30 AD, Rome
 - B. 16th century, Holland
 - C. 18th century, America
 - D. 19th century, England

7. What is the wholesale value for Missouri greenhouse operations grossing \$100,000 or more in 1999?

- A. \$34.3 million
- B. \$41.6 million
- C. \$34.7 billion
- D. \$4.7 billion

8. Which of the following are the two major floriculture crops in Missouri?

- A. Cut flowers and potted flowering plants
- B. Foliage plants and bedding/gardening plants
- C. Cut flowers and foliage plants
- D. Potted flowering plants and bedding/gardening plants

- 9. How does Missouri rank among all 50 states in floriculture production?
 - A. 31st
 - B. 28th
 - C. 26th
 - D. 16th
- 10. What is the correct ranking of the top five states involved in U.S. floriculture sales, from the highest to lowest amount contributed?
 - A. California, Florida, Michigan, Texas, and Ohio
 - B. Michigan, Ohio, Florida, Texas, and California
 - C. Florida, California, Texas, Michigan, and Ohio
 - D. Texas, Florida, California, Ohio, and Michigan
- 11. Who is the international leader in floriculture production?
 - A. Australia/New Zealand
 - B. Central America
 - C. Kenya
 - D. The Netherlands

Short-Answer Question: Write the answer in the space provided.

- 12. What are three recent changes in the greenhouse industry?
 - A.

В.

C.

1999 Missouri Floriculture Crops

<u>Crop</u>	Wholesale Value	
Cut Flowers	\$ 281,000	
Foliage Plants	2,192,000	
Potted Flowering Plants	11,711,000	
Bedding and Garden Plants	20,085,000	
TOTAL	\$34,269,000	

Wholesale value for operations grossing \$100,000 in sales "Floriculture." *Missouri Farm Facts*, 2000.

4704.2



Source: http://www.usda.gov/nass/aggraphs/val_type.htm

Total Value

Wholesale value for operations grossing \$100,000 or more in sales "Floriculture Crops." USDA National Agricultural Statistics Service, <http://www.usda.gov/nass/aggraphs/ws_tenyr.htm> accessed 2/20/02



2000 U.S. Bedding and Garden Plant Sector

"Floriculture Crops 2000 Summary." National Agricultural Statistics Service, Agricultural Statistics Board, USDA, April 2001. http://usda.mannlib.cornell.edu/reports/nassr/other/zfr-bb/ accessed 2/21/02.

Lesson 1: Scope and Development of the Greenhouse Industry

Name

AS 1.1

Growing Possibilities

Objective: Appraise biotechnological advancements in the greenhouse industry.

Directions: Work in small cooperative groups. Select one of the biotechnological advancements listed below. Access the Internet, university Extension publications, trade journals, or any other reliable resources for information. As you evaluate how the biotechnological advancement affected the greenhouse industry, consider the questions listed below but do not limit your focus to them. Present your findings to the class. (Suggested approaches are giving a PowerPoint presentation, displaying graphs or other visual aids, making an oral presentation, creating a model, etc.)

Biotechnological Advancements

- Improving performance and handling during production and after harvest
- Incorporating selected pathogen-resistant genes into new plants
- Producing leaves that stay greener longer
- Delaying leaves' aging process
- Stimulating plant growth
- Improving tolerance to herbicides
- Reducing amount of pesticide application required
- Developing strategies for managing disease to increase production
- Improving quality and taste of fruits and vegetables

Suggested Web Sites

Clark, David G. "Floriculture Biotechnology." http://hort.ifas.ufl.edu/people/clark.htm> accessed 2/20/02.

Giacomelli, Gene A. "Controlled Environment Agricultural Center." Agricultural & Biosystems Engineering Department, University of Arizona. ">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings>">http://ag.arizona.edu/ceac/research/archive/structures.htm#glazings">http://ag

- 1. How has this advancement affected the greenhouse environment? Does it also affect the outside environment?
- 2. Does it have any adverse consequences?

- 3. How does this biotechnological advancement help the greenhouse industry?
- 4. How does it affect plant growth?
- 5. How does this technique affect working conditions in the greenhouse?
- 6. How does it impact trade relations and/or economic status among states and countries? Is it profitable?
- 7. What is the justification for using this advancement in an average greenhouse operation?

AS 1.2

Lesson 1: Scope and Development of the Greenhouse Industry

Name

Investigating a New Product in the Greenhouse Industry

- *Objective:* Identify one new product currently used in the greenhouse industry and evaluate how well it performs.
- **Directions:** Refer to recent professional greenhouse journals such as *Greenhouse Grower*, *Greenhouse Product News*, *Grower Talks*, and *Greenhouse Business* and search the Internet in order to identify a new product used in the greenhouse industry. Respond to the following questions. Share your findings with the class. For example, demonstrate the product, create a diorama or illustration of it, give a PowerPoint presentation, etc.
- 1. What is the purpose of this product?
- 2. Does it replace an older, similar device?
- 3. What new features does it have?
- 4. How does the product work?
- 5. Do greenhouse personnel need special training in order to use it?
- 6. Where can this product be obtained?

Lesson 1: Scope and Development of the Greenhouse Industry

Name_____

AS 1.3

Global Greenhouses

Objective: Compare and contrast greenhouse operations in two different countries.

Directions: Work in small groups of three or four students. Select two countries that export greenhouse-grown crops. Use the Internet, books, magazines, and science and social studies textbooks to answer the following questions. Relate your findings to the class in a PowerPoint presentation, poster, collage, oral presentation, or any other format that answers the questions.

Country #1	Country #2
Exported Greenhouse Crops	
#1	#2

- 1. What are the distinguishing features of the climate, topography, and environmental factors in each country?
- 2. How do these factors affect the construction of a greenhouse (building materials, site selection, etc.)?
- 3. How much of each country's economy depends upon this major greenhouse crop?
- 4. Where do these countries export their crops? Are those markets increasing or declining?
- 5. What forms of assistance are available to the greenhouse owners in each country?
- 6. How much labor is available for greenhouse operations in each country? What training or benefits are provided?
- 7. How and where are the crops sold?

GREENHOUSE OPERATION AND MANAGEMENT

Unit I: The Greenhouse Industry

Lesson 2: Career Opportunities in the Greenhouse Industry

Competency/Objective:

Outline career paths and SAE (Supervised Agricultural Experience) opportunities available in the greenhouse industry.

Study Questions

- 1. How do the responsibilities of grower, retailer, and wholesaler differ?
- 2. What career opportunities are available in the greenhouse industry?
- 3. How is the structure of a greenhouse operation organized?
- 4. How does continuing education enhance career opportunities in the greenhouse industry?
- 5. What opportunities does the greenhouse industry offer the agricultural education program?

References/Supplies/Materials

- 1. *Greenhouse Operation and Management* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2002.
- 2. Transparency Master
 - TM 1.4 Organizational Structure of a Large Greenhouse Operation
- 3. Activity Sheets

AS 1.4 Greenhouse Careers: Which One? How to Succeed? AS 1.5 Getting Involved in the Greenhouse Industry

- 4. Help wanted ads in trade journals: Greenhouse Grower, Greenhouse Business, Grower Talks, Greenhouse Product News
- 5. "Greenhouse Positions." New Haven Gardens. < http://www.nhg.com/empgh.htm>.

- 6. "Jobs in Horticulture" <hortjobs.com>
- 7. "Nursery and Greenhouse Worker." http://www.edinetconnect.com/cat/careers/nurserysw.html
- 8. Yahoo! Careers. "Landscaping, Groundskeeping, Nursery, Greenhouse, and Lawn Service Occupations." http://careers.yahoo.com/employment/oco/ocos172.html
- 9. GrowNative! <www.conservation.state.mo.us/programs/grownative>
- 10. "Key #2 SAE" <www.ffa.org/programs/lps/html/sae.html>
- 11. "Welcome to SAE Central" <www.cals.ncsu.edu/agexed/sae/toolbox/index.html>
- 12. Garton, Bryan L. and Scott Stone. Agricultural Education, University of Missouri-Columbia. Joint State Staff in Agricultural Education *Agricultural Education Program Planning Handbook for Missouri Schools*. pp. 109-111, 1997.

TEACHING PROCEDURES

A. Review

After defining the four fields included in horticulture, the previous lesson surveyed the past and recent developments in the greenhouse industry and assessed its economic importance to Missouri, the United States, and the world. This lesson focuses on various careers available in this industry and styles of management structures, and it justifies why continuing education is valuable to someone interested in pursuing a career in the greenhouse industry. Lesson 2 also describes opportunities that the greenhouse industry offers agricultural education programs - SAE (Supervised Agricultural Experience) in particular.

B. Motivation

Ask the class if anyone has planted a garden or raised a crop. Find out if they have participated in FFA or 4-H activities that involved growing vegetables or flowers. Then ask them to describe activities they enjoyed performing while working with plants. As you record their responses on the board, continue the discussion by asking students to identify the types of greenhouse-related jobs that appeal to them the most.

- C. Assignment of Study Questions
- D. Supervised Study

Lead students in collecting the information needed to answer and discuss the study questions. Instructor may choose to work on one study question at a time or have students answer all the study questions before the discussion. Another option is to have students work in a cooperative learning environment and have groups work on different study questions.

E. Discussion

Lead students in a discussion of the study questions. Supplement students' responses and information with additional materials when needed.

1. How do the responsibilities of grower, retailer, and wholesaler differ?

Explain that the greenhouse industry is generally divided into three sectors: growers, retailers, and wholesalers. Career opportunities exist in all categories.

A. Grower

- 1. Produces one or more crops for sale to wholesaler
- 2. Is skilled in cultivation, irrigation, and other cultural practices
- 3. Usually delegates marketing to wholesaler if operation is small
- B. Retailer
 - 1. Sells greenhouse crops to public
 - 2. Is found in various marketing areas: grocery stores, florist shops, malls, etc.
- C. Wholesaler
 - 1. Sells crops and related products to retailer
 - 2. Sells plants from growers on consignment

2. What career opportunities are available in the greenhouse industry?

The broad categories listed above may suggest specific career opportunities. Ask students to identify the types of tasks required to run a greenhouse. Write their responses on the board and organize them under the job titles listed below. Remind the class that these job titles, descriptions, and duties may vary in different greenhouse operations. The following list should be used only as an example. Have the class complete AS 1.4.

A. Assistant grower (entry level)

- 1. Helps grower as directed
- 2. May work in maintenance, shipping, and/or delivery
- B. Grower
 - 1. Prepares growing medium for bulbs, seeds, and cuttings
 - 2. Grafts plants and transplants seedlings and rooted cuttings
 - 3. Irrigates plants as required
 - 4. Fertilizes plants according to specific needs
 - 5. Responds to customers' questions, as needed
- C. Greenhouse service technician
 - 1. Maintains physical facilities in greenhouse
 - 2. Supervises maintenance crew
 - 3. Oversees irrigation, electricity, and drainage systems; in charge of construction, etc.
- D. Production specialist
 - 1. Stays up-to-date on technical developments
 - 2. Schedules when crops should be planted

- 3. Manages space allocation within greenhouse
- E. Marketing manager
 - 1. Oversees sales operations
 - 2. Handles customer relations (both existing and potential customers)
 - 3. Assesses postharvest crops: grades and stores plants and flowers
 - 4. Prepares each crop for shipment
- F. Manager/owner
 - 1. Organizes and prioritizes work flow
 - 2. Maintains financial records; develops marketing plan
 - 3. Selects types and quantities of plants to be grown
 - 4. Selects and orders growing supplies (fertilizer, seeds, etc.)
 - 5. Hires, supervises, and evaluates staff
 - 6. Responds to customers' questions

3. How is the structure of a greenhouse operation organized?

Ask students why it is important to understand how employees fit within the industry's organization. How does the management structure affect their choice of jobs within that industry? Display TM 1.4 as an example of how a large greenhouse operation may be organized.

- A. Small greenhouse operations
 - 1. One manager/owner oversees all aspects of the business.
 - 2. Several assistants may help the manager.
 - 3. Owner/manager specializes in all greenhouse operations.
- B. Large greenhouse operations
 - 1. Manager may or may not be the owner.
 - 2. Multiple greenhouse specialists contribute to different aspects of the operation.
 - 3. Each department (e.g., marketing, production) has its own manager.
 - 4. Employees work in various departments.

4. How does continuing education enhance career opportunities in the greenhouse industry?

Refer to the activities mentioned in the Motivation. Now ask students how they could make them more challenging. What would they need to know and do in order to advance? Explain that the term "continuing education" applies to more than just schoolwork.

- A. Reading professional literature (trade journals, publications from county Extension services, etc.)
- B. Joining greenhouse-related organizations
- C. Participating in meetings sponsored by professional groups
- D. Keeping up-to-date in latest advances in greenhouse operations
- E. Sharing technological information with coworkers, supervisors, and greenhouse experts
- F. Taking advanced courses in area(s) of interest

5. What opportunities does the greenhouse industry offer the agricultural education program?

Engage the class in a discussion about various agriculture-related activities that they have participated in, as sponsored by 4H and FFA. Agricultural education embraces many opportunities for growth. Mention that Supervised Agricultural Experience is a dynamic program that helps students gain practical knowledge and apply skills they've learned in the classroom to the real world. As you generate a discussion about the benefits of SAE, ask students to infer how these opportunities apply to employment in the greenhouse industry. Have the class complete AS 1.5.

A. Workplace readiness for students

- 1. Develop successful work habits and skills
 - a. Responsibility
 - b. Work ethic (being prompt, communicating clearly and honestly, cooperating with coworkers and supervisor, taking pride in one's work, etc.)
 - c. Record-keeping skills
 - d. Critical-thinking skills
 - e. Decision-making skills
- 2. Provide real-world experience
 - a. On-the-job training
 - b. Gain management skills
 - c. Develop job-seeking skills
 - d. May earn a salary while learning
- e. Receive guidance from individuals experienced in greenhouse operations
- B. Supervised Agricultural Experience opportunities
 - 1. Entrepreneurship program
 - a. Students plan, organize, and operate enterprise and are financially responsible for own horticulture-related business.
 - b. Students own all necessary materials needed to run the operation and keep financial records in order to assess how well their investment is performing.
 - c. Students participate in entrepreneurial projects sponsored by GrowNative! (www.conservation.state.mo.us/programs/grownative). Individuals or chapters grow plugs or produce seeds of native plants.
 - d. Examples include growing bedding plants in school greenhouse and raising poinsettias for sale.
 - 2. Placement program
 - a. Students are placed in an agricultural business that interests them.
 - b. This can be a paid position or an unpaid internship.
 - c. Placement program occurs outside of regular school hours.
 - d. Examples include working in a florist shop and in a nursery on weekends.
 - 3. Directed work experience
 - a. Students, instructors, and parents help plan activity.
 - b. This is an unpaid position.
 - c. Examples include working in the school greenhouse.

- C. Agriscience research projects
 - 1. Experimental activity
 - a. Key features
 - i. Has a specific, measurable objective
 - ii. Follows scientific process
 - iii. Involves several steps and requires time commitment
 - iv. Relates to significant scientific/agricultural principle, issue, or question
 - v. Supervised by instructor
 - b. Examples:
 - i. Comparing effect of different amounts of light on plant growth
 - ii. Comparing two types of fertilizer on plant development
 - iii. Analyzing effectiveness of different display techniques on amount of plant sales in a nursery
 - iv. Demonstrating effect of various levels of soil acidity on plant growth
 - 2. Analytical (nonexperimental) activity
 - a. Key features
 - i. Collecting information from different sources then evaluating the data
 - ii. Creating a finished product
 - b. Examples:
 - i. Planning a perennial garden for a senior center
 - ii. Constructing a landscaping ad campaign directed toward new home owners

D. Award/activities

- 1. Career Development Events
 - a. Floriculture
 - b. Nursery/landscape
 - c. Agricultural sales
- 2. Proficiency awards
 - a. Horticulture
 - b. Turf and landscape management
 - c. Floriculture
 - d. Fruit and/or vegetable production
 - e. Specialty crops
- 3. School/community service
 - a. Building Our American Communities grant
 - b. Partnerships with groups, such as chambers of commerce and garden clubs
 - c. Providing landscaping on school grounds
 - d. Providing arrangements/plants for special school occasions, such as banquets and graduation
 - e. Examples: For school grounds or a community center, create a hummingbird habitat, plant a garden with all-native Missouri plants, create garden to attract songbirds and butterflies, create garden made up of shade-loving plants

F. Other Activities and Strategies

- 1. Show the class the following video, available from CATER (Career & Technical Education Resources), 2 London Hall, University of Missouri-Columbia: *Growing Futures Career Opportunities in the Green Industry* (AG V157).
- 2. Take students to a local, commercial greenhouse, nearby florist, or nursery. Have them ask the owner/manager about the types of jobs needed to run the operation. Have students observe one of the growers or production specialists and ask questions about their jobs. As an alternative, ask members of the greenhouse industry to visit the class to discuss how their businesses are run. Before the guests arrive, have students prepare interview questions.
- 3. Ask a representative from the community college level to talk about Postsecondary Agriculture Students (PAS), which is similar to FFA.

G. Conclusion

Before identifying a career in the greenhouse industry, it is important to distinguish between growers, retailers, and wholesalers. Each of the various positions within the industry offers unique opportunities. Typically, small greenhouse operations have a simple management structure, with the owner/manager assuming most of the responsibilities, whereas larger organizations have multiple layers of managers and workers. By continuing one's education through diverse means, a greenhouse worker can advance within the profession. The greenhouse industry offers many programs in agricultural education, especially SAE.

H. Answers to Activity Sheets

AS 1.4 Greenhouse Careers: Which One? How to Succeed?

(For each of the following, information about continuing training/education is at the instructor's discretion.)

- 1. Greenhouse service technician
- 2. Production specialist
- 3. Grower
- 4. Marketing manager

AS 1.5 Getting Involved in the Greenhouse Industry

Instructor's discretion.

- I. Answers to Assessment
 - 1. B
 - 2. A
 - 3. B
 - 4. C

- 5. A
- 6. C
- 7. B, K 8. C, G, J
- 8. C, C 9. E
- 9. E 10 E
- 10. F, H 11. D, I, L
- 11. D, 1 12. A
- 13. <u>Small greenhouse operations</u>: Students may list any two of the following:
 - A. One manager/owner oversees all aspects of the business.
 - B. Owner/manager specializes in all greenhouse operations.
 - C. Several assistants may help the manager.
 - Large greenhouse operations: Students may list any two of the following:
 - A. Manager may or may not be the owner.
 - B. Each department (e.g., marketing, production) has its own manager.
 - C. Employees work in various departments.
 - D. Multiple greenhouse specialists contribute to different aspects of the operation.
- 14. The student may list any four of the following:
 - A. Reading professional literature (journals, publications from county extension service, etc.)
 - B. Joining greenhouse-related organizations
 - C. Participating in meetings sponsored by professional groups
 - D. Keeping up-to-date in latest advances in greenhouse operations
 - E. Sharing technological information with coworkers, supervisors, and greenhouse experts
 - F. Taking advanced courses in area(s) of interest
- 15. Instructor's discretion

Lesson 2: Career Opportunities in the Greenhouse Industry

Name			

Date_____

ASSESSMENT

Match the three parts of the greenhouse industry with their tasks. Write the correct letter in the space provided.

1.	Sells directly to the public	А.	Grower
2.	Is skilled in cultural practices	В.	Retailer
3.	Is located in shopping areas	C.	Wholesaler
4.	Sells to retail businesses		
5.	May delegate marketing responsibilities		
6.	Sells plants on consignment		

Match the job titles listed on the left with the description of their responsibilities. Some job titles have multiple descriptions. Write the correct letter(s) in the space provided.

7.	Greenhouse service technician	А.	Keeps current on plant technology
8.	Grower	B.	Takes care of maintenance
9.	Assistant grower	C.	Irrigates and fertilizes plants
10.	Marketing manager	D.	Hires, supervises, evaluates staff
11.	Manager/owner	E.	Helps grower
12.	Production specialist	F.	Supervises sales
		G.	Prepares growing medium
		H.	Handles customer relations

- I. Plans workload of greenhouse workers
- J. Transplants seedlings

Greenhouse Operation and Management

- K. Supervises electrical and irrigation systems
- L. Selects and orders growing supplies

Short-Answer Questions: Write the answers in the space provided.

13. What are two differences in the organizational structure of small and large greenhouse operations?

Small Greenhouse Operations	Large Greenhouse Operations
А.	А.
В.	В.

- 14. What are four ways to continue education and/or training in the greenhouse industry?
 - A. B. C. D
- 15. For each type of SAE program listed below, what are five activities related to the greenhouse industry? (Select activities that were **not** mentioned in the Student Reference.)

Placement Program	Entrepreneurship Program	Agriscience Projects
А.	А.	А.
В.	В.	В.
С.	С.	C.
D.	D.	D.
E.	E.	E.

Organizational Structure of a Large Greenhouse Operation



Name_____

UNIT I: THE GREENHOUSE INDUSTRY

AS 1.4

Lesson 2: Career Opportunities in the Greenhouse Industry

Greenhouse Careers: Which One? How to Succeed?

- *Objective:* Appraise which greenhouse career is appropriate and infer how continuing education would enhance this career.
- *Directions:* Read the scenarios below that describe various interests and skills of several individuals. Assume that everyone wants to expand his or her skills by working in a greenhouse. Identify which greenhouse-related career suits each person. Then suggest a type of training or form of continuing education that would help this person improve his or her skills in the greenhouse industry. Discuss your choices with the class.
 - 1. Betty likes to work with her hands. On her farm, she built a sheep shed and repaired it as needed. She also installed a watering system for the lambs.

Career

Continuing Training/Education_____

2. Isabella's favorite class is science, with a special interest in chemistry. She enjoys investigating how things work. At home, she exposed her oregano and basil plants to different fertilizers.

Career _____

Continuing Training/Education_____

3. Ron's tomatoes, herbs, and roses won awards at FFA contests. He would like to cultivate orchids, tropical foliage, and ferns. Hydroponics also interests him.

Career	

Continuing Training/Education_____

4. Thaddeus has had his own lawn service throughout high school. He maintains all financial records and keeps in touch with his clients. Currently, he is seeking new customers.

Career _____

Continuing Training/Education_____

Lesson 2: Career Opportunities in the Greenhouse Industry

Getting Involved in the Greenhouse Industry

- *Objective:* Devise an SAE (Supervised Agricultural Experience) activity for a job in the greenhouse industry.
- *Directions:* Select one of the following careers and identify a task required in that area. First assess your interests and skills and then develop an SAE activity that exposes you to this job. If possible, organize placement in that job.

Assistant grower	Marketing manager	
Grower	Manager/owner	
Greenhouse service technician	Wholesaler	
Production specialist	Retailer	
Career	Specific Job	

Assessing Personal Interests and Skills

To identify a specific job within a career that interests you, review the Student Reference, search the Internet for additional information, or read greenhouse-related publications. Then respond to the following questions.

- 1. Why does this job appeal to you?
- 2. What personal skills or traits do you have that would complement this job?
- 3. What demands would this job make upon your time, talents, and efforts?
- 4. How would you handle these challenges?
- 5. Does this job lead to other careers that interest you?
- 6. What types of questions and requirements would an employer have for someone who is seeking this position? Role-play as the employer and then as the employee.

AS 1.5

Name_____

Developing an SAE Activity

With the guidance of your instructor, create an SAE activity that accommodates your interests.

- 1. Find a greenhouse operation that offers the type of work that interests you.
- 2. Identify a supervisor at the greenhouse who is willing to give you hands-on experience.
- 3. List several tasks that are required for the job you selected.
- 4. Outline a procedure for performing these tasks.
- 5. Create a self-assessment tool for the job you are pursuing.

If you are placed in a job related to greenhouses, complete the following section.

Recording Your Progress

Track your experiences in your new job in the greenhouse industry. Listed below are some suggestions for recording your SAE activity.

- Compile a scrapbook, including
 - > Your time sheet and wage statements (if applicable)
 - > Photographs of each stage of the job and of your coworkers and supervisor
 - Articles related to this career
- Prepare a PowerPoint presentation of your experience for the class
- Relate your experiences orally to the class using visual aids
- Demonstrate to the class one or more of the skills you acquired