

Lesson B1–11

Growing Potted Perennials

Unit B. Floriculture

Problem Area I. Greenhouse Crop Production

Lesson II. Growing Potted Perennials

New Mexico Content Standard:

Pathway Strand: Plant Systems

Standard: III: Apply fundamentals of production and harvesting to produce plants.

Benchmark: III-A: Apply fundamentals of plant management to develop a production plan.

Performance Standard: 1. Identify and select seeds and plants. 2. Manipulate and evaluate environmental conditions (e.g., irrigation, mulch, shading) to foster plant germination, growth and development. 3. Evaluate and demonstrate planting practices (e.g., population rate, germination/seed vigor, inoculation, seed and plant treatments).

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe the importance and scope of perennials.
2. Discuss the factors involved in propagating perennials.
3. Explain production practices used in forcing perennial plants to flower.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Ball, Vic. *Ball RedBook*, Sixteenth Edition. Batavia, Illinois: Ball Publishing, 1998.

Other Resources. The following resources will be useful to students and teachers:

Noland, Dianne A. and Kirsten Bolin. *Perennials for the Landscape*. Danville, Illinois: Interstate Publishers, Inc., 2000.

Nau, Jim. *Ball Perennial Manual*. Batavia, Illinois: Ball Publishing, 1996.

Biondo, Ronald J. and Dianne A. Noland. *Floriculture: From Greenhouse Production to Floral Design*. Danville, Illinois: Interstate Publishers, Inc., 2000.

List of Equipment, Tools, Supplies and Facilities

Writing surface
Overhead projector
Copies of student lab sheets
Computer
LCD projector
Live perennials for identification

Terms. The following terms are presented in this lesson (shown in bold Italics):

Herbaceous perennials
Perennials

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Obtain some photos or scan pictures from magazines showing spectacular perennial gardens. Choose photos that display different types of plantings in different types of settings. Show the images to the class using multi-media technology. During the show ask the students for their opinions. Ask whether they would consider perennials in their own gardens. Offer the possibility of producing perennials as a class project to raise funds.

Summary of Content and Teaching Strategies

Objective 1: Describe the importance and scope of perennials.

Anticipated Problem: What is the importance and scope of perennials?

- I. The sale of perennials is booming throughout the country, and more producers are growing perennials alongside their bedding plants.
 - A. **Perennials** are plants that have a life cycle of more than two years. Most perennials grown for floriculture sales are **herbaceous perennials** or non-woody plants that have a life span of more than two years and complete vegetative and reproductive phases annually.
 - B. Perennials have a long sales period. They can be sold before bedding plants in the spring, with bedding plants during the main season, and throughout the summer and fall.
 - C. Perennials are more difficult to grow than bedding plants. One reason consumers are attracted to perennials is because of the hundreds of species from which to choose and grow. However, the many different species often require different production practices. The grower must understand the differences and provide the needs of each particular species during production.

Build a multimedia presentation using materials found in the Ball RedBook. Use the multimedia presentation as a guide for lecture-discussion, during which students take notes. An alternative is to have the students build an outline of the important points presented.

Visit a local greenhouse operation that produces perennials. Invite a greenhouse owner or grower to speak to the class about trends with perennial production, career opportunities and production practices. Include identification of the most common perennial plants as part of the instruction. Use live plant materials or quality photographs for identification.

Objective 2: Discuss the factors involved in propagating perennials.

Anticipated Problem: What factors are involved in propagating perennials?

- II. Perennials are propagated by sexual or asexual means, depending on the species and how they will be grown.
 - A. Sexual propagation is sometimes complicated by multiple seed dormancies. For example, seeds might require moist chilling or warm stratification before they will germinate. Sexual propagation is used in the production of plugs.
 - B. Asexual propagation might involve simply dividing mature plants, rooting cuttings, or applying more sophisticated tissue culture methods.
 1. A rule of thumb for division is to divide spring flowering perennials in late summer or autumn and summer flower perennials in early spring.

2. Tissue culture or micropropagation is allowing growers to produce large numbers of plants in a short period of time.
- C. Because of the difficulties involved in propagation of perennials, many growers leave propagation to specialists and choose to buy rooted cuttings, liners, or plugs.
1. A common practice is to buy liners or plugs from mid autumn into winter, pot them in 4-inch or larger finishing containers, and force them for spring sales.
 2. Other growers buy plants in the summer or fall, pot them in gallon containers, and overwinter them in poly-houses or cold frames. The extra rooting time results in larger plants and more flowers.

Continue the lecture-discussion format using the multi-media presentation. Focus on the propagation of perennials. Require students to take notes during the discussion. Provide hands-on learning experiences in propagating perennials. Purchase plugs, liners or rooted cuttings to be finished by students on the school grounds or in a greenhouse off campus.

Objective 3: Explain production practices used in forcing perennial plants to flower.

Anticipated Problem: What production practices are used in forcing perennial plants to flower?

- III. Sales are improved if the perennials are in flower at the time of sale. Requirements in forcing the plants to flower vary with the species of perennial. Day length, temperature, and juvenility may play a role in flowering.
- A. Some perennials are short day plants, some long day plants and others day-neutral.
1. Long day plants stay in a vegetative growth stage when given less than 12 hours of light and flower more quickly when given 14–15 hours of light.
 2. Short day perennial plants can be kept vegetative by breaking the night darkness with lighting from 11:00 p.m. until 2:00 a.m.
- B. Some perennial plants require or benefit from vernalization or a cold period. Vernalization is fairly easy to provide. Plants can be propagated in the summer, potted in the fall, given cold treatment during the winter in cold frames or in ground beds, and forced in the spring. Plants handled in this manner typically have well-developed roots and develop into uniform, well-branched plants.
- C. Some perennials simply have to age before they will flower. In most cases, the aging of the plant needs to precede vernalization. The age of a plant is determined by counting leaves.
- D. Perennials can be forced after the vernalization period.
1. Night temperatures around 60 to 65°F are effective for forcing. Plants grown under cool temperatures appear to be of higher quality than those forced at warm temperatures.
 2. Negative DIF, meaning cool days and warm nights, is effective in maintaining plant height and plant quality.

3. Growth regulators can be effective in maintaining plant size. B-nine is the most widely used growth regulator.
4. Fertilize perennials with a constant liquid feed of 100 ppm to 200 ppm nitrogen and potassium. Reduce the rate to 100 ppm nitrogen and potassium once they begin to flower.

Require students to take notes on the major points involved in perennial crop production. Monitor students' mastery of the material through the discussion. Then, have the students put into practice concepts discussed. Have the students conduct additional research on the cultural requirements for the perennials selected to be grown. Use laboratory sheet LS: B1–11A, Perennial Production and Care to reinforce student understanding of the material covered.

Force perennials in the school greenhouse. Involve the students in all phases of the production. Include aspects of marketing and selling of the plants. Where possible, include industry people in the lesson. Seek help from a grower in purchasing plants and scheduling the crop.

Review/Summary. Restate the student learning objectives at the conclusion of the lesson. Review the material that has been covered in class discussions, laboratory activities, and other learning experiences. Call on students to explain the content associated with each objective. Use their responses as the basis for determining any areas that need re-teaching. Questions at the end of the chapters in the textbook may also be used in the review/summary. Reinforce student learning by having students grow perennial plants in the school greenhouse or a greenhouse off campus. Administer identification quizzes using live plant material.

Application. Application can involve the following student activities using the attached lab sheets:

LS: B1–11A—Perennial Production and Care

Evaluation. Focus on student achievement of the objectives for the lesson when evaluating student performance. Use various evaluation techniques, such as student performance during oral review of the material, application of skills in the greenhouse setting, completion of the laboratory sheet, and a written exam. A sample written test is included with this lesson and can be adapted to local needs.

Answers to Sample Test:

Part One: Completion

1. Perennials
2. Herbaceous perennials
3. more difficult
4. sexual or asexual

5. rooted cuttings, liners, or plugs
6. vernalization
7. Negative
8. by counting leaves
9. 60 to 65°F
10. 100 ppm to 200 ppm
11. higher
12. potted, cold treatment, forced, roots, well-branched
13. long
14. different
15. dividing, tissue culture

Test

Lesson B1–11: Growing Potted Perennials

Part One: Completion

Instructions. Provide the word or words to complete the following statements.

1. _____ are plants that have a life cycle of more than two years.
2. _____ are non-woody plants that have a life span of more than two years and complete vegetative and reproductive phases annually.
3. Perennials are _____ to grow than bedding plants.
4. Perennials are propagated by _____ means, depending on the species.
5. Many growers leave propagation to specialists and choose to buy _____.
6. Some perennial plants require or benefit from _____.
7. _____ DIF, meaning cool days and warm nights, is effective in maintaining plant height and plant quality.
8. Some perennials have to age before they will flower and the age of a plant is determined _____.
9. Night temperatures around _____ are effective for forcing.
10. Fertilize perennials with a constant liquid feed of _____ nitrogen and potassium.
11. Plants grown under cool temperatures appear to be of _____ quality than those forced at warm temperatures.
12. Plants can be propagated in the summer, _____ in the fall, given _____ during the winter in cold frames or in ground beds, and _____ in the spring. Plants handled in this manner typically have well-developed _____ and develop into uniform _____ plants.
13. Perennials have a _____ sales period.
14. The many different species of perennials often require _____ production practices.
15. Asexual propagation might involve simply _____ mature plants or applying more sophisticated _____ methods.

Lab Sheet

Perennial Production and Care

Purpose:

Students will gain a greater understanding of the production and care of select perennial plants.

Instructions:

Identify ten perennial plants to be grown as a class project. If perennials are not to be grown by the class, complete the exercise with perennials of interest or perennials commonly grown in your region. Use various resources to complete the table below:

Perennial plant (common and Latin names)	Description (size, flower color, etc.)	Method(s) of propagation	Greenhouse production requirements	Season of bloom	Landscape use