

Lesson B1–10

Growing Bedding Plants

Unit B. Floriculture

Problem Area I. Greenhouse Crop Production

Lesson 10. Growing Bedding Plants

New Mexico Content Standard:

Pathway Strand: Plant Systems

Standard: IV: Exercise elements of design to enhance an environment (e.g., floral, forest, landscape, farm).

Benchmark: IV-A: Apply basic design elements and principles to create a design using plants.

Performance Standard: 1. Conduct a site evaluation for physical condition and design implications. 2. Apply elements of design (e.g., line, form, texture, color). 6. Select plant(s) for design.

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

1. Describe the importance and scope of the bedding plant industry.
2. Discuss the factors involved in getting bedding plants started.
3. Explain production practices used in growing bedding plants.

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:

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

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

Boodley, James W. *The Commercial Greenhouse*, Second Edition. Albany, New York: Delmar Publishers, 1998.

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

McMahon, Robert W. *An Introduction to Greenhouse Production*. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, The Ohio State University.

List of Equipment, Tools, Supplies and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Copies of student lab sheets
Computer
LCD projector
Industry catalogs
Live bedding plants

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

Bedding plants
Cell packs
DIF
Fertigation
Finished
Hard basket
Leached
Plugs
Shelf life
Soft basket
Toning

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.

Ask the students whether they think they could make money for the FFA chapter or horticulture club by selling bedding plants. Encourage them to brainstorm ideas. Pursue ideas that involve the school greenhouse or the possible use of a greenhouse off campus. In the process, provide seed catalogs and supply catalogs in order to identify some general starting costs. Ask the students what they think people would pay for bedding plants and how much the chapter or club could make.

Summary of Content and Teaching Strategies

Objective I: Describe the importance and scope of the bedding plant industry.

Anticipated Problem: What is the importance and scope of the bedding plant industry?

- I. Herbaceous annual plants used for ornamental display or vegetable production are called **bedding plants**. Bedding plants are valued for the colorful blanket of flowers or foliage they lend to the landscape when used in planting beds or containers.
 - A. The most popular bedding plants based on nationwide sales include impatiens, petunias, pansies, marigold, seed begonias and seed geraniums.
 - B. Bedding plants include garden vegetables started in containers and transplanted to the garden such as tomatoes, broccoli, and peppers.
 - C. Sales of bedding plants out pace all other sub groups of the floriculture industry in the United States.
 - D. Some trends in the bedding plant industry are important to note.
 1. Marketing of bedding plants has gone beyond greenhouses and garden centers. Consumers can buy bedding plants at large retail chains and grocery stores for example.
 2. Greenhouse operations have grown in size due to the development of automated systems for plant production.
 3. Automation has triggered the use and development of plugs. **Plugs** are small plants grown in small amounts of medium in divided trays. The size of the medium “plug” may be 5/8" or larger.
 4. Bedding plants are being grown in larger containers including 4-inch pots. Higher quality plants can be produced in the larger containers. These containers lengthen the shelf life of the plants. **Shelf life** is a term given to the period a plant maintains health while on display for sale.

Have the students read appropriate sections in Floriculture: From Greenhouse Production to Floral Design as homework or during supervised study. As part of the reading assignment, have the students build an outline of the important points. Then, lead a class discussion over the content of the reading. Require students to take notes during the discussion. Also, engage students during the discussion through selective

questioning. For this portion of the lesson and the others, build multi-media presentations using materials found in this lesson and recommended references. Show the presentation as a visual aid to emphasize key points.

Visit a local greenhouse operation that produces bedding plants. Invite a greenhouse owner or grower to speak to the class about trends, career opportunities and production practices. Include identification of the most common bedding plants as part of the instruction. Use live plant materials or quality photographs. Assign the students LS: B1–10A to increase their knowledge of individual bedding plants.

Objective 2: Discuss the factors involved in getting bedding plants started.

Anticipated Problem: What factors are involved in getting bedding plants started?

- II. Bedding plant production begins with scheduling and is followed by propagation of the plants.
 - A. Generally, growers determine a sale date. They then count backwards from that date the number of weeks it takes to have the plants grown to peak appearance and health. Depending on the species it takes anywhere between 8 weeks to 18 weeks to produce bedding plants in 48 cells per flat.
 - B. Most bedding plants are grown from seed. A few bedding plants, including zonal geraniums and fuchsias, are propagated by cuttings.
 1. Commercial mixes that are uniform, fine-textured and free of disease organisms are recommended for germinating seeds.
 2. Most seeds germinate well in a medium with a pH between 5.5 and 5.8
 3. Most bedding plant seeds germinate when the medium is kept at temperatures around 75°F.
 4. Different species like different levels of moisture so it is important to give special attention to watering. Keep the medium moist until the seeds have sprouted.
 - C. Guidelines have been established for hand sowing of seed.
 1. Use fresh seed.
 2. Determine whether the seeds require any special treatment such as light or darkness, or a cold period.
 3. Plant the seeds no deeper than three times the diameter of the seed in rows. Rows are recommended to reduce the possible spread of disease across the entire flat.
 4. Transplant to cell packs or pots when the first true leaves have formed. **Cell packs** are molded plastic containers divided into separate growing compartments in which the plants will be **finished**, or grown to a saleable size. When transplanting, gently lift the seedlings from the germination flat, and handle the seedlings by their leaves only since their stems are very easily bruised.
 - D. Plug technology has revolutionized the bedding plant industry worldwide.
 1. Large operations produce plugs in trays holding 70 to 800 plants. They sell the plugs to growers throughout the country, who transplant the plants into finish containers.

By purchasing plugs for finishing, growers do not have to be concerned with buying, storing, and germinating seeds.

2. Plug producers strive to produce uniform, compact plants with a high number of dark green leaves.
3. It takes 6 to 10 weeks to grow quality plugs.

Focus class discussion on the sections of the reading assignment in Floriculture: From Greenhouse Production to Floral Design dealing with starting bedding plants. Require students to take notes during the discussion. Provide hands-on learning experiences in propagating bedding plants. Purchase plugs to be finished by students in the school greenhouse or in a greenhouse off campus. Refer to Floriculture: From Greenhouse Production to Floral Design for information pertaining to propagation techniques. Use LS: B1–10B to enhance student understanding of how to schedule a bedding plant crop.

Objective 3: Explain production practices used in growing bedding plants.

Anticipated Problem: What production practices are used in growing bedding plants?

- III. High quality bedding plants have flowers just ready to open, numerous breaks, and are compact. Temperature, moisture levels, growing medium, light, and fertilization programs impact the quality of the plants.
 - A. As with other floriculture crops, watering is the most important cultural practice in growing bedding plants.
 1. The frequency of watering depends on the weather conditions and the sizes of the pots and plants.
 2. A general rule is to water as the medium approaches drying, then wait until it approaches drying before watering again. A key is to water thoroughly or until the medium is saturated and water drains through the drainage holes of the containers. An additional benefit to heavy watering is soluble salts are **leached** or washed from the medium.
 3. The use of automated watering systems has increased dramatically and has reduced the amount of labor required in production.
 - B. Bedding plants respond well to constant liquid feeding that begins at the time of transplanting. Fertilizing while watering or irrigating the plants is known as **fertigation**.
 1. A recommended rate of fertilization is 200 ppm nitrogen, 100 ppm phosphorus, and 200 ppm potassium.
 2. If soilless mixes are used it is important to select fertilizers that contain micronutrients.
 - C. Bedding plants like warm temperatures that range from 65 to 72°F nights. DIF can be effectively used to control stretching of the plants. **DIF** is defined as the difference between day and night temperatures. Keeping the night temperature 6-8 degrees warmer than the day temperature halts cell elongation and plant stretching.

- D. Growth regulators are sometimes used to maintain plant height and to encourage compact growth. A-Rest and B-Nine are the two most widely used growth regulators.
- E. Most bedding plants grow best in full sunlight. Shade-loving bedding plants like impatiens, wax begonia, and coleus might require shading in late spring and early summer.
- F. Hanging baskets have grown in popularity with consumers. There are two main groups of hanging baskets:
 1. **Hard baskets** are those that have plants grown from cuttings, such as fuchsia, geraniums, and New Guinea impatiens.
 2. **Soft baskets** contain plants grown from seed, such as petunias, impatiens, and browallia.
 3. Hard baskets require 12 to 15 weeks to produce, while soft baskets can be produced in 6 to 8 weeks.
- G. Prior to shipping, growers of bedding plants prepare the plants for post-production environments. They lower temperatures in the greenhouse to slow plant respiration and they reduce the fertilizer levels 50 % when flower buds first become visible. This procedure of preparing plants before shipping is called **toning**.

Review the content of the readings in Floriculture: From Greenhouse Production to Floral Design. Require students to take notes on the major points presented during the discussion. Use visual aids to outline key elements involved in crop production. Monitor students' mastery of the material through the discussion. Then, have the students put into practice concepts discussed in those portions of Floriculture: From Greenhouse Production to Floral Design that relate to bedding plant production. Use TM: B1–10A as a visual aid in explaining DIF.

Schedule and grow bedding plants in the school greenhouse. Involve the students in the production of plants from planting seeds to sale. Provide instruction as to how to sow seed, transplant seedlings, water, and fertilize. Include aspects of marketing and selling of bedding 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 bedding 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: B1–10A—Bedding Plant Flash Cards
- LS: B1–10B—Scheduling Bedding Plants

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: Matching

1=d, 2=e, 3=j, 4=g, 5=k, 6=f, 7=b, 8=h, 9=a, 10=c, 11=i

Part Two: Completion

1. backwards
2. constant liquid
3. 200, 100, 200
4. full
5. micronutrients
6. flowers just ready to open, numerous breaks, are compact
7. lower temperatures, reduce the fertilizer
8. A-Rest, B-Nine
9. 75
10. 3 times the diameter of the seed

Part Three: Short Answer

1. a. Marketing of bedding plants has gone beyond greenhouses and garden centers. Consumers can buy bedding plants at large retail chains and grocery stores for example.
b. Greenhouse operations have grown in size due to the development of automated systems for plant production.
c. Automation has triggered the use and development of plugs.
d. Bedding plants are being grown in larger containers including 4-inch pots.
2. The most popular bedding plants based on nationwide sales include impatiens, petunias, pansies, marigold, seed begonias and seed geraniums.
3. A general rule is to water as the medium approaches drying, then wait until it approaches drying before watering again. A key is to water thoroughly or until the medium is saturated and water drains through the drainage holes of the containers.

Test

Lesson B1–10: Growing Bedding Plants

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | |
|-------------------|----------------|----------------|
| a. Bedding plants | e. Finished | i. Shelf life |
| b. Cell packs | f. Hard basket | j. Soft basket |
| c. DIF | g. Leached | k. Toning |
| d. Fertigation | h. Plugs | |

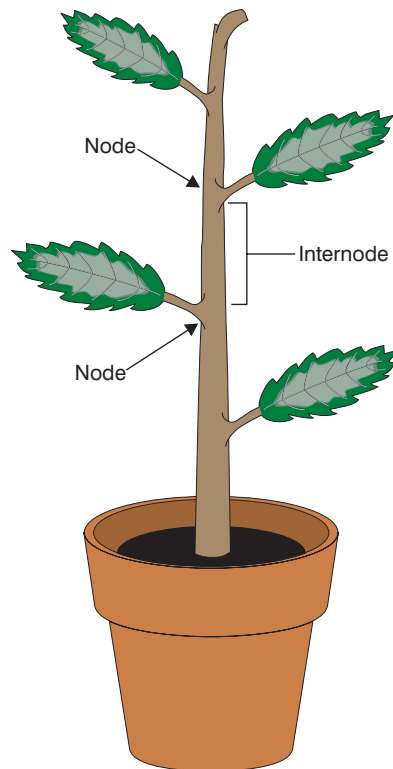
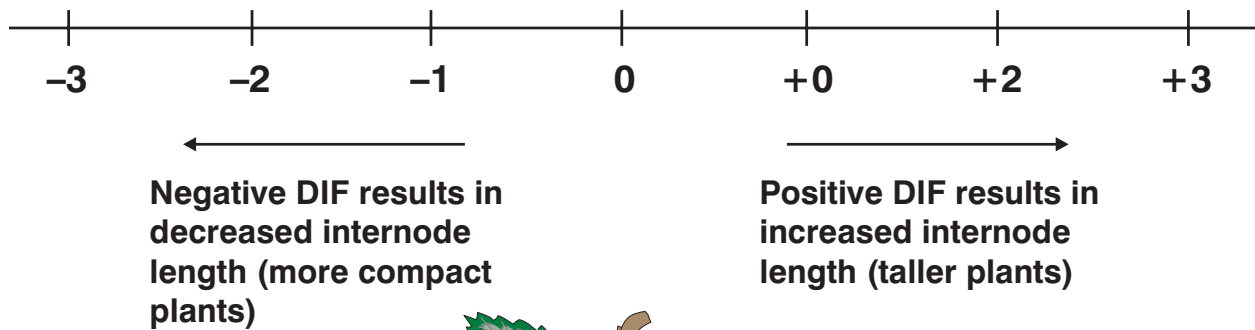
- _____ 1. Fertilizing while watering or irrigating the plants.
- _____ 2. Grown to a saleable size.
- _____ 3. Baskets that contain plants grown from seed, such as petunias, impatiens, and browallia.
- _____ 4. Soluble salts washed from the medium.
- _____ 5. Procedure of preparing plants before shipping.
- _____ 6. Baskets that have plants grown from cuttings, such as fuchsia, geraniums, and New Guinea impatiens.
- _____ 7. Molded plastic containers divided into separate growing compartments
- _____ 8. Small plants grown in small amounts of medium in divided trays.
- _____ 9. Herbaceous annual plants used for ornamental display or vegetable production.
- _____ 10. The difference between day and night temperatures effectively used to control stretching of the plants.
- _____ 11. A term given to the period a plant maintains health while on display for sale.

Part Two: Completion

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

1. Generally, growers determine a sale date, and then count _____ from that date the number of weeks it takes to have the plants grown to peak appearance and health.

EFFECTS OF DIF ON INTERNODE LENGTH



- Examples:
- 1) A day temperature of 70 and night temperature of 72 gives a negative 2 DIF.
 - 2) A day temperature of 70 and night temperature of 67 gives a positive 3 DIF.

(Courtesy, Interstate Publishers, Inc.)

Lab Sheet

Bedding Plant Flash Cards

Purpose:

Students will develop bedding plant identification skills as well as specific cultural requirements for bedding plants.

Materials:

Seed catalogs
4 × 6 index cards
Scissors
Tape or glue

Instructions:

1. Determine which bedding plants are to be placed on flash cards. A suggestion is to use the state approved identification list for the horticulture career development event.
2. Browse catalogs printed by seed or plug supply companies for photographs representative of the particular bedding plant to be used. In some cases more than one photograph or card might be made.
3. Cut the selected photos from the catalogs and affix them to one side of the index card.
4. On the opposite side of the index card record the name of the bedding plant, the range of flower or foliage colors, one or two key identification characteristics, and cultural requirements. Examples of cultural requirements include sun or shade exposure and moist soil.
5. Use the cards to quiz one another on identification of bedding plants and bedding plant culture.

Lab Sheet

Scheduling Bedding Plants

Purpose:

Students will develop a bedding plant schedule to maximize available greenhouse production space and to ensure saleable crops by the targeted market date.

Instructions:

Using information from seed catalogs and Tables 12-2 and 12-3 from *Floriculture: From Greenhouse Production to Floral Design* complete the table for bedding plants to be grown.

Variety	Amount of seed	Cost of seed	Number of plugs	Cost of plugs	Weeks to sale (seed or plug)	Sow date or plugs order	Transplant date	Plants per flat	Number of flats

Variety	Amount of seed	Cost of seed	Number of plugs	Cost of plugs	Weeks to sale (seed or plug)	Sow date or plugs order	Transplant date	Plants per flat	Number of flats
Totals									