Lesson B1–6

Growing Minor Potted Flowering Crops

Unit B. Floriculture

Problem Area 1. Greenhouse Crop Production

Lesson 6. Growing Minor Potted Flowering Crops

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.

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

1. Identify African violets and cultural requirements for their production.
2. Identify Cyclamen and cultural requirements for their production.
3. Identify holiday cacti and cultural requirements for their production.
4. Identify florist azalea and cultural requirements for their production.
5. Identify Kalanchoe and cultural requirements for their production.
**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:


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


**List of Equipment, Tools, Supplies and Facilities**

- Writing surface
- Overhead projector
- Transparencies from attached masters
- Copies of student lab sheet
- Computer
- LCD projector
- Plants and materials for producing crops

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

- African violet
- Cyclamen
- Florist azaleas
- Holiday cacti
- Hypocotyl
- Kalanchoe
- Liner

**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.

*Bring live flowering potted plants to be covered to class and challenge the students to determine the origins of the plants. Encourage them to seek information on the Internet and to use various reference books. Ask them why they think these particular plants have been selected for use in the floriculture industry.*
Summary of Content and Teaching Strategies

Objective 1: Identify African violets and cultural requirements for their production.

Anticipated Problem: What are African violets and their cultural requirements for production.

I. African violets are common in homes because of their bright flowers ranging from white to pink to purple and their easy care. African violets are native to equatorial Africa. They are grown primarily for Valentine’s Day, Easter, and Mother’s Day.

A. African violets are propagated by leaf petiole cuttings with 8–10 plantlets developing on each cutting. Stick cuttings 1 to 1½” into a light medium, maintain temperatures at 75°F, and provide 1,200 to 1,500 foot candles of light. Roots form in three weeks and plantlets in 3 to 4 additional weeks.

B. Carefully remove the plantlets and separate them so there is only one per pot. Peat-base medium with a pH around 6.0 is recommended, as are 4-inch azalea pots for finishing.

C. Water the plants with capillary mats or ebb and flood systems to avoid wetting the leaves. Cold water on the leaves causes enzymes to coagulate creating unsightly white spots on the leaves. When watering deliver 100 to 150 ppm nitrogen and potassium. Never allow African violets to dry out.

D. Provide between 1,000 and 2,000 foot candles of light.

E. Total production time from cutting to sale normally takes 12 to 14 weeks for Valentine’s Day and 8 to 10 weeks for a Mother’s Day crop.

F. Major pests and diseases include aphids, cabbage loopers, leaf rollers, crown rot, root rot and powdery mildew.

Have the students read about growing African violets in Floriculture: From Greenhouse Production to Floral Design. Review the reading material through class discussion. During the review have the students take notes. Enhance the discussion by building an outline of key points on a chalkboard or with an overhead projector. Another suggestion is to show a multimedia presentation from which students would be required to take notes. Use TM: B1–6A for identification purposes. TM: B1–6B should be used to illustrate propagation techniques.

The best teaching strategy might be the actual grow an African violet crop. Apply the approved practices discussed in Floriculture: From Greenhouse Production to Floral Design. Have students propagate African violets by cuttings, pot the plantlets, and grow the plants in the classroom or school greenhouse. A visit to a local greenhouse operation that produces African violets would give students an opportunity to see how they are grown in the industry. Assign the students LS: B1–6A for African violets or any other floriculture crop for which they have an interest.
Objective 2: Identify Cyclamen and cultural requirements for their production.

Anticipated Problem: What are Cyclamen and their cultural requirements for production.

II. Cyclamen, native to the Mediterranean, have attractive white, pink, carmine, and red flowers. They are classified as a cool crop because they prefer cooler greenhouse temperatures. Major sales are in winter and spring.

A. Cyclamen are propagated from seed sown in plug trays.
B. A peat-based medium with a pH ranging from 5.5 to 6.3 is recommended. To avoid rot the hypocotyl, a structure similar to a radish, must be placed above the medium.
C. Start a fertilizing program after the roots have reached the bottom of the pot. Use rates of 100 to 150 ppm nitrogen. Maintain temperatures at 65 to 68°F.
D. After 16 to 18 weeks, transplant to 5- or 6-inch finishing pots. Fertilize at 200 to 250 ppm nitrogen. Provide 65 to 68°F temperatures. Never let the medium dry completely and keep the humidity in the greenhouse high. Light intensity should be between 4,000 and 6,000 foot candles.
E. Flower buds develop after the plant has become well established and has 15 to 40 leaves. Once the flower buds are visible drop fertilizer rates to 100 ppm nitrogen and potassium and lower temperatures to between 60 and 62°F.
F. Common pest problems include cyclamen mites, spider mites, aphids and thrips. Diseases include Fusarium wilt, Botrytis and Phytophthora.

Prepare the students by having them read related sections in Floriculture: From Greenhouse Production to Floral Design. Require students to take notes on the major points presented. Follow the reading with a discussion on how to grow a cyclamen crop. Have the students expand their notes based on the discussion. The discussion can also serve as a way to monitor students’ mastery of the material. Present TM: B1–6C for cyclamen identification.

Enhance the learning experience on how to grow a cyclamen crop by involving the students in the production of a crop. Obtain plugs and have students perform tasks involved in production including potting, watering, fertilizing, and adjusting temperatures. Include industry people in the lesson. Set up a field trip to a commercial greenhouse that produces cyclamen and/or arrange to have a grower speak to the class about how to produce a crop.

Objective 3: Identify holiday cacti and cultural requirements for their production.

Anticipated Problem: What are holiday cacti and their cultural requirements for production.

III. Holiday cacti include three different succulent plants that flower naturally at three different times of the year. They are Thanksgiving cactus, Christmas cactus, and Easter cactus. Holiday cacti are short-day plants and are thermoperiodic.

A. Holiday cacti are propagated by cuttings.
B. They grow well in a well drained medium that has a pH between 5.5 and 6.0. Fertilize holiday cacti at a rate of 100 to 150 ppm nitrogen and potassium with each watering until one month before flower buds form.

C. Thanksgiving and Christmas cacti initiate flower bud development at 55°F nights while Easter cactus initiate flower bud development when given 47 to 53°F nights.

Have the students read portions of Floriculture: From Production to Floral Design related holiday cacti as a homework assignment or during supervised study. Require students to take notes on the major points as they read. Follow the reading assignment with a class discussion on how to schedule and grow a crop. Use visual aids to outline key elements involved in crop production. TM: B1–6D can be used effectively to differentiate between the types of holiday cacti. Monitor students’ mastery of the material through the discussion.

Plan to have the students grow a crop of holiday cactus in the school greenhouse. Involve the students in the production of the crop from potting to sale. Have students perform tasks involved in production including the potting, watering, and adjusting temperatures. Where possible, include industry people in the lesson. Seek help from a grower in scheduling and forcing the crop. Arrange to have a grower appear as a guest speaker. Set up a field trip to a commercial greenhouse.

**Objective 4:** Identify florist azalea and cultural requirements for their production.

**Anticipated Problem:** What are florist azalea and their cultural requirements for production.

I. Two species of Rhododendron are grown as *florist azaleas*. One is native to Japan and the other is native to China. Most florist azaleas are grown as prefinished plants in warm states that have high light intensity, including California, Florida, Alabama, and Mississippi. Growers in northern states force the prefinished plants to flower. Florist azaleas are woody plants.

A. Propagation of florist azaleas is done by stem cuttings that take 6 to 12 weeks to root. The rooted cuttings are pinched four to five times over a two year period to encourage branching. The small-branched plants, known as *liners*, are sold in 4-, 6-, or 8-inch sizes.

B. Growers receive the liners in May. They pot the liners in azalea pots using pure peat moss with a pH between 4.5 and 5.5. Vegetative growth is encouraged with 75 to 85°F day temperatures and 65°F night temperatures. The plants should also receive high light intensity and long-day treatment. The growers pinch the plants in June.

C. Flower bud initiation occurs when the plants receive short days and 60–65°F nights.

D. To flower, a flower bud dormancy mechanism must be satisfied. A treatment of 10–12 weeks at 40°F is recommended. The azaleas are removed from the cooler and forced at 50 to 55°F temperatures.

E. Problems with pests and diseases are minimal for the forcer. Some problems are spider mites, *Phytophthora*, root rot and *Botrytis*.

Have the students read the appropriate sections in Floriculture: From Greenhouse Production to Floral Design. Follow the reading with a class discussion on the florist azalea production. During the discussion,
require the students to take notes. Use questioning to determine the level of student understanding of the topic. Visit a local greenhouse operation to see how they produce a florist azalea crop. Use TM: B1–6E for identification purposes.

**Objective 5:** Identify Kalanchoe and cultural requirements for their production.

**Anticipated Problem:** What are Kalanchoes and their cultural requirements for production.

V. Kalanchoes are succulent plants native to Africa and Asia. Their clusters of small flowers can be yellow, orange, red, and pink. Kalanchoes are short day plants.

A. Stem cuttings are taken without the use of rooting hormones to propagate Kalanchoes. The cuttings are lighted to maintain vegetative growth and rooting occurs in one to two weeks.

B. Pot Kalanchoes using well-drained medium with a pH between 6.0 and 6.5. Grow the plants at night temperatures of 65 to 68°F. A constant feed of 300 to 400 ppm nitrogen and potassium is recommended until the start of short day treatment. Plants in 5 or 6 inch pots should be pinched two weeks after planting.

C. Flower bud initiation occurs when the plants are given short days. At this time lower the fertilization rates to 150 to 200 ppm nitrogen and potassium. It takes 8 to 10 weeks from the beginning of short days to flower.

D. Major pest problems include mealy bugs, cabbage loopers, and aphids. Crown rot, root rot, and powdery mildew are common disease problems.

Prepare the students by having them read related sections in Floriculture: From Greenhouse Production to Floral Design. Follow the reading with a discussion on growing a Kalanchoe crop. Use the discussion as a way to monitor students’ mastery of the material. Enhance the learning experience on how to grow Kalanchoes by involving the students in the production of a crop from rooted cuttings to flower. TM: B1–6F should be used for identification purposes.

**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. Review production practices put into use while growing plants in the school greenhouse or in a greenhouse off campus. Administer identification quizzes using live plant material.

**Application.** Application can involve the following student activity using the attached lab sheet:

LS: B1–6A—Individualized Crop Report
**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=f, 2=b, 3=a, 4=g, 5=c, 6=e, 7=d

**Part Two: Completion**
1. leaf petiole
2. Valentine’s Day, Easter, and Mother’s Day
3. Cool crop
4. become well established and has 15 to 40 leaves
5. short-day, thermoperiodic
6. cuttings
7. seed sown in plug trays
8. stem cuttings

**Part Three: Short Answer**
1. Cold water on the leaves causes enzymes to coagulate creating unsightly white spots on the leaves.
2. Thanksgiving and Christmas cacti initiate flower bud development at 55°F nights while Easter cactus initiate flower bud development when given 47 to 53°F nights.
3. Rooted florist azalea cuttings are pinched four to five times over a two year period to encourage branching.
4. To flower, a flower bud dormancy mechanism must be satisfied. A treatment of 10–12 weeks at 40°F is recommended.
5. Kalanchoes are short day plants.
Part One: Matching

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

a. African violet  d. holiday cactus  g. liners
b. cyclamen       e. hypocotyl        f. kalanchoe
c. florist azalea

_____ 1. Succulent plants native to Africa and Asia with clusters of small yellow, orange, red, and pink flowers.
_____ 2. Plants native to the Mediterranean that have attractive white, pink, carmine, and red flowers.
_____ 3. Plants native to equatorial Africa commonly found in homes because of their bright flowers ranging from white to pink to purple and their easy care.
_____ 4. Florist azaleas are sold as these small-branched plants.
_____ 5. Woody plants native to Japan and China and grown as prefinished plants in warm states that have high light intensity.
_____ 6. A structure similar to a radish found at the base of cyclamen.
_____ 7. Includes three different succulent plants that flower naturally at three different times of the year.

Part Two: Completion

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

1. African violets are propagated by ________________ cuttings.
2. African violets are grown primarily for ______________, __________, ________ ________________.
3. Cyclamen are classified as a __________ because they prefer cooler greenhouse temperatures.
4. Flower buds develop on cyclamen after the plant has ____________________________
   __________________________________.
5. Holiday cacti are ________________ plants and are ________________________.
6. Holiday cacti are propagated by ____________ .
7. Cyclamen are propagated from ________________________________ .
8. Propagation of florist azaleas is done by _____________ that take 6 to 12 weeks to root.

**Part Three: Short Answer**

**Instructions.** Provide information to answer the following questions.

1. Why is it important to avoid getting cold water on the leaves of African violets?

2. When do holiday cacti initiate flower buds?

3. Why are florist azaleas pinched?

4. Why must florist azaleas be given a cold treatment?

5. Why are Kalanchoe cuttings lighted to simulate long days?
AFRICAN VIOLET

(Courtesy, Interstate Publishers, Inc.)
AFRICAN VIOLET
PROPAGATION TECHNIQUES

[Diagram of an African Violet plant with a close-up of leaf cuttings being propagated in a pot of soil.]
TYPES OF HOLIDAY CACTI

Easter Cactus

Christmas Cactus

Thanksgiving Cactus

(Courtesy, Interstate Publishers, Inc.)
FLORIST AZALEA

(Courtesy, Ball Horticultural Co.)
KALANCHOE

(Courtesy, Ball Horticultural Co.)
Lab Sheet

Individualized Crop Report

Purpose:
Students will learn about the origin, growing requirements, and uses of crops through research and practice.

Instructions:
Use the Internet, reference books, textbooks, human resources, and knowledge gained through application to prepare a report on a particular crop. Write a paper reporting your findings and be prepared to give an oral presentation to the class. The topics listed below can serve as a guide for the report.

1. Latin and common names for the plant.
2. Origin of the plant.
3. Description of the plant.
4. Season for which the plant is produced.
5. Photoperiodic response group.
7. Growing schedule.
8. Recommended watering practices.
9. Recommended fertilization rates.