Lesson B2–2

Caring for Fresh Flowers and Foliage

Unit B. Floriculture

Problem Area 2. Floral Design

Lesson 2. Caring for Fresh Flowers and Foliage

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). **7.** Prepare plants and plant products for distribution.

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

1. Explain the basic requirements of cut flowers.
2. Understand the causes of deterioration and death of flowers.
3. Describe the steps of effective conditioning of flowers and foliage.
4. Explain the importance of using floral preservatives.
5. Learn about commercial packing and shipping.

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:

McKinley, William J., Jr. *The Cut Flower Companion*. Danville, Illinois: Interstate Publishers, Inc., 1994.

Griner, Charles. *Floriculture: Designing & Merchandising,* Second Edition. Albany, New York: Delmar Publishers, 2002.

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Copies of student lab sheet
Cut flowers—carnations are ideal and inexpensive
Graduated cylinders
Water
Floral preservative in packets
Clear soda pop

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

Acidic
Alkaline
Bent necks
Conditioning
Ethylene inhibitors
Graded
Hard water
Hardened
Photosynthesize
Precooled
Respiration
Salinity
Senescence
Soft water
Stem blockage

Transpiration
Turgid

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 in a cluster of flowers and a package of floral preservative from a florist. Ask the students if they know the contents of the floral preservative and why the flowers might need it. Continue the discussion on how to care for the flowers. If one of the flowers is wilted or has a bent neck ask the students what the causes might be. This will help you determine the level at which they are functioning for this topic and will highlight the areas that should be addressed.

Summary of Content and Teaching Strategies

Objective 1: Explain the basic requirements of cut flowers.

Anticipated Problem: When a flower is cut, what are its needs?

I. Even though fresh flowers have been removed from plants, they continue to ***photosynthesize***—produce food from sunlight. In that process, there are certain requirements.

   A. High Quality Water

      1. A flower is 90 percent water. Plant cells that are filled with water are called ***turgid***. As the flowers continue to photosynthesize and respire, they will need water. A water analysis can be conducted to determine quality.

      2. A pH test of the water will determine whether water is ***acidic***, a pH below 7, or ***alkaline***, a pH above 7 (a measurement of the amount of hydroxides in the water). If floral preservative is added to water, it will increase the acidic level, thereby increasing water uptake in plants.

      3. Water is classified as either ***hard water,*** that which contains a high level of minerals, or ***soft water,*** which has been treated to lower the mineral level. The hardness will effect the pH.

      4. ***Salinity*** is the final water quality factor; it is the measurement of the total dissolved salts in water. Salt clogs the xylem of the floral stem, preventing water movement, resulting in wilting and weakening of the stem. Salinity needs to be less than 200 ppm.

   B. Food and Sugar—The cut flower is in need of sugars, the two most common of which are sucrose and dextrose. The flower gets these sugars either through stored sugars or through supplemental sugars provided in a floral preservative.

C. Healthy Environment—Fresh cut flowers should be placed in an environment free from ethylene gases, which cause deterioration in the flowers. Fruit should not be stored in a floral cooler because this causes ethylene gas exposure. ***Conditioning***, the preparation of materials for arranging by allowing adequate solution uptake, is conducted when flowers and greens arrive at the design site. Water that is approximately 100 to 110°F is used. Warm water increases uptake and contains less trap air. Flowers should be re-cut and defoliated to a point that no leaves will be in the water solution. Allow the flowers to take up water at room temperature before being placed in a cooler. Once the flowers are ***hardened*** (full of water after conditioning) they can be placed in a cooler that is 34–38°F. Floral coolers are better than refrigerators because they provide controlled humidity levels in addition to cooling.

D. Sanitation—Sanitary procedures in the handling process will provide flowers that will last a long time. Hands, tools, knives, shears, containers and work areas need to be kept sanitary. Introduction of bacteria and organisms can be avoided by cleaning work areas, coolers and containers on a regular basis.

One of the recommended texts can be used to strengthen the students' understanding of the conditions that should be provided for cut flowers. The overhead could be used as part of a lecture/discussion on the topic that the teacher would present. Display TM: B2–2A. Use it to summarize the basic needs of fresh cut flowers.

Objective 2: Understand the causes of deterioration and death of flowers.

Anticipated Problem: What causes a flower to deteriorate and die?

II. When a flower is cut from the mother plant, the deterioration process begins because the flower no longer has a water or food source. It is up to the human to provide a substitute. The flower will eventually die. This is referred to as ***senescence.*** Major causes of flower deterioration or death are:

A. Genetic Life—each flower has a certain inherent life span based on its genetics. Our goal is to achieve for each flower the maximum life span allowed by nature. For example:

Flower	Life Span
Daylily	1 day
Dutch Iris	3–5 days
Rose	5–7 days
Carnations	10–14 days
Chrysanthemums	14–21 days

B. Wilting—Wilting is caused by either excessive water loss or lack of absorption. Blocked vascular tissue could be another cause of wilting. ***Transpiration***, water loss in the process of respiration, is often increased when flowers are in warm environments with low humidity. ***Respiration*** is the process of burning glucose to create energy. Transpiration can

be reduced by avoiding drafts and over-handling flowers. ***Stem blockage*** is the most common cause of poor absorption. The xylem becomes clogged and no water movement can occur in the stem.

C. Timing of Harvest

1. Time of day—Flowers should never be cut when they are wilted; therefore, avoid cutting in the heat of the day. Evening is the best time because plants have been photosynthesizing all day. Morning is the second best time to cut, because plants are full of water.
2. Stage of Flowering—The best time to harvest is just before a flower is fully open. Exceptions to the rule include the daisy and flowering bulb crops, which are harvested in bud stage, and the calla lily, which will not develop further once it is cut.

D. Ethylene Gas Exposure—Ethylene gas is a natural plant hormone produced by aging flowers, foliage, fruits and vegetables. Common signs of ethylene exposure include large amounts of fallen petals, dropped florets, and yellowing leaves. Growers and wholesalers prevent this damage by using ***ethylene inhibitors***, products that block or tie up the gas.

E. Disease or Damage—Flowers that arrive from the market and those picked in the garden should be of the highest quality. They must be inspected for disease and insect damage.

Have students use their biology background to cover these topics. If the students understand what plants need to survive, then they should have a good understanding of why plants deteriorate after cutting. Cover this information in a general discussion based on their biological knowledge. Use TM: B2–2B to help illustrate the types of flowers that are sensitive to ethylene gas exposure.

Objective 3: Describe the steps of effective conditioning of flowers and foliage.

Anticipated Problem: How are cut flowers and foliage conditioned to maximize vase life?

III. Conditioning plant materials include the following steps:

A. Flowers should be unpacked and inspected upon receiving. A report should be made to the wholesaler of any problems or mistakes.

B. Prioritize the order of processing; wilt-prone and expensive flowers should be processed first.

C. Remove sleeves, ties and any foliage that might contact water in a container.

D. Under warm water, re-cut all stems, removing ½ inch to 1 inch. Professional underwater cutting devices are recommended in order to maximize life span.

E. Use specific treatment solutions as needed.

F. Place in floral preservative solution mixed at the proper concentration. Too little encourages bacterial growth, too much can cause toxicity.

G. Let the flowers remain at room temperature for 2 to 3 hours to increase water uptake.

H. Place the flowers in a cooler set at 34 to 38°F with a high humidity level and constant light.

I. Milky stems should be treated by quickly dipping them in boiling water for five seconds and then placing them in a floral preservative solution. Alternative methods include exposing the cut end into a match flame without burning it or placing it in very warm floral preservative solution.

J. Roses that have lost turgidity near the flower head are called ***bent necks***. They can be revived by placing the stems in a warm preservative solution and recutting them under water.

Whenever you receive your first shipment of flowers from a wholesaler, walk the students through the steps mentioned in this objective. Cover the information as you demonstrate each one of them. Then in the future as they perform the steps, have them verbally explain each as it is conducted. Display TM: B2–2C to help illustrate how a bent neck rose can be revived.

Objective 4: Explain the importance of using floral preservatives.

Anticipated Problem: How does a floral preservative extend the life of cut flowers?

IV. Floral preservatives will extend the life of cut flowers. A preservative contains a sugar as a supplemental food source, an acidifier to decrease the chance of stem clogging, and a bactericide to kill bacteria in a vase or stem. Pre-treatments are used before preservatives to reduce ethylene exposure and to hydrate flowers that are wilt prone, such as Gerbera and roses. All flowers can benefit from a hydrating solution treatment.

Have the class read the section on floral preservatives in Floriculture: From Greenhouse Production to Floral Design. Through class discussion, make sure students understand why preservatives are used. Bring samples of preservatives to class and have the students identify the three main ingredients.

Objective 5: Learn about commercial packing and shipping.

Anticipated Problem: How are flowers sent from the field to the florist?

I. The majority of cut flowers sold in the United States are produced in foreign countries. The commercial packing and shipping process affects the life span of cut flowers in the floral market. First, flowers are ***graded***—separated into groups based on factors such as quality, uniformity, and size. They are also graded by stem quality, length, and strength. The flowers are then placed in bundles and sleeved for shipping. Delicate flowers such as fuji mums and Gerbera are individually sleeved.

After bundling, the flowers are boxed for shipment and ***precooled***, a method of quickly replacing the warm air with cool air inside the box; this is also called being dry packed. More delicate flowers, such as snapdragons and gladioli are packed in hampers and stored in an upright position. The largest amount of flowers are shipped via air and then via truck to the marketplace.

Pictures of the harvesting process and shipping process can enhance understanding of the lesson's objectives. Floriculture: From Greenhouse Production to Floral Design will be helpful in demonstrating the

concepts. Carry on a discussion as to the steps involved and use TM: B2–2D to help reinforce how different flowers are packaged.

Review/Summary. Flowers to be used in floral design work need to receive proper care and conditioning to achieve maximum vase life. All cut flowers will die but there is a great deal of conditioning steps that can be provided to extend their life. It is recommended that prior to receiving the first shipment of flowers from the wholesaler, you review this material with your students. The concepts are reinforced when you actually show them the proper steps involved in conditioning and caring for cut flowers and foliage.

Application. Consider using this information when conditioning flowers and foliage for projects in floral design, or with cut flowers from a garden. It is recommended to schedule a field trip to a wholesale flower market to see the conditioning steps and the packaging process. LS: B2–2A, The Role of Floral Preservatives, will also help students to apply the lesson content.

Evaluation. Evaluation might be done in a lab setting by watching students perform the steps involved in conditioning and caring for cut flowers. A sample written test is also attached.

Answers to Sample Test:

Part One: Matching

1 = g, 2=c, 3=d, 4=a, 5=e, 6=f, 7=h, 8=b

Part Two: Completion

1. Hard, Soft
2. Precooling
3. Ethylene Inhibitors
4. Salinity

Part Three: Short Answer

A. Unpack and inspect.
B. Prioritize processing.
C. Remove sleeves, ties and foliage that contact water.
D. Re-cut all stems.
E. Use specific treatment solutions.
F. Place in floral preservative solution mixed at the proper concentration.
G. Let the flowers remain at room temperature for 2–3 hours.
H. Place the flowers in a cooler.

Sample Test Name_____

Test

Lesson B2–2: Caring for Fresh Flowers and Foliage

Part One: Matching

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

a. acidic	d. transpiration	g. hardened
b. bent necks	e. alkaline	h. turgid
c. graded	f. conditioning	

_____ 1. Flowers that are full of water after conditioning.

_____ 2. Separated into groups.

_____ 3. Plant water loss in the process of respiration.

_____ 4. A solution with a pH below 7.

_____ 5. A solution with a pH above 7.

_____ 6. The preparation of floral materials for arranging by allowing adequate solution uptake.

_____ 7. Plant cells that are filled with water.

_____ 8. Roses that have lost turgidity near the floral head.

Part Two: Completion

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

1. Water is classified as either _____, that which contains a high level of mineral or _____, water which has been treated to lower the mineral level.
2. A method of replacing warm air with cool air inside a box is called _____.
3. _____ _____ block and tie up ethylene gas which causes deterioration.
4. _____is the water quality factor that measures the total dissolved salts in water.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

List the steps that you would take to condition flowers.

A.

B.

C.

D.

E.

F.

G.

H.

TM: B2–2A

BASIC NEEDS OF FRESH CUT FLOWERS

Needs	
High Quality Water	Proper pH of 3 to 4.5 Low total dissolved salts
Food	Sugars—supplemented in preservative solution
Healthy Environment	Clean air Proper temperature
Sanitation	Provide clean water Use clean tools

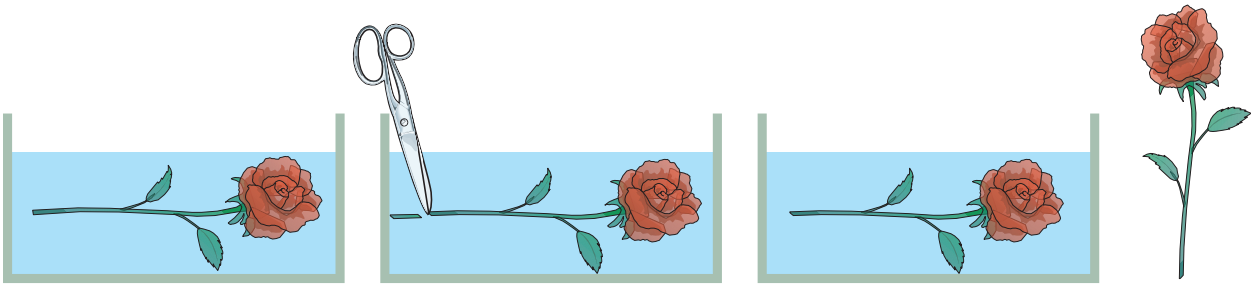
TM: B2–2B

FLOWERS SENSITIVE TO ETHYLENE

- Alstroemeria
- Anemone
- Baby's Breath
- Bouvardia
- Carnations
- Cornflower
- Delphinium
- Freesia
- Lily
- Snapdragon

TM: B2–2C

REVIVING A BENT NECK ROSE



TM: B2–2D

COMMON BUNCH SIZES FOR MAJOR FLORAL CROPS

Bunch Size	Examples
25	Roses, Carnations, Leatherleaf, Palms
10	Tulips, Daffodils, Iris, Delphinium, Larkspur, Snapdragons, Fuji Mums, Gladioli, Lilies, Liatris
Variable by Weight	Pompon Mums, Filler Flowers—Baby's Breath, Sea Lavender, Monti Casino Asters
Single	Gerbera, Tropicals, Orchids

Name_____

Lab Sheet

The Role of Floral Preservatives

Objective

The students should find out why the preservative solution is used in conditioning and caring for flowers.

Supplies

5 Carnations
5 Graduated cylinders
Water
Floral preservative—single packs
1 Liter of clear soda pop

Steps

1. Mix up three solutions of floral preservative
   A Prepare as described on packet.
   B. Prepare by doubling the amount of preservative.
   C. Prepare using only half of the preservative.
2. Mix 10 ml of the soda with 90 ml of water (often a home remedy when floral preservative is unavailable).
3. Place 50 ml of each solution into a graduated cylinder, the fifth cylinder is the control using only water.
4. Place one carnation in each solution.
5. Collect data on the condition and the amount of water uptake over a ten day period. Add more solution to keep it at a level of 50 ml each day. Observe the color and condition of the water.