

Unit E: Plant Propagation

Lesson 4: Propagating Plants by Division, Separation, and Layering

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

1. Explain the difference between separation and division in plant propagation.
2. Describe layering and identify four common forms of layering.

Recommended Teaching Time: 2 hours

Recommended Resources: The following resources may be useful in teaching this lesson:

- A PowerPoint has also been developed with use of this lesson plan

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint slides
Transparency Masters
Copies of Student Lab Sheet

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide #2):

- Air layering
- Bulbs
- Bulblets
- Corms
- Division
- Mound layering
- Plant crown
- Rhizomes
- Separation
- Simple layering
- Trench layering
- Tubers

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 to class a variety of bulbs, corms, tubers, and rhizomes (lily, tulip, iris, potato, dahlia etc.). Encourage students to discuss what plant grows from each plant structure. What is the advantage of using these structures for plant propagation?

**** Use this activity to lead into the advantages and differences of separation and division.**

Summary of Content and Teaching Strategies

Objective 1: Explain the difference between separation and division in plant propagation.
(PowerPoint Slide #3)

- I. Some plants produce vegetative plant structures that can be removed intact from the parent plant as a natural means of reproducing. These vegetative plant structures, bulbs, corms, rhizomes, and tubers serve as food storage areas for the plant. In addition, they are structures for vegetative reproduction.

(PowerPoint Slide #4)

Separation is the propagation method in which these natural structures are simply removed from the parent plant and planted to grow on their own. When one of these structures is cut into sections that will then grow into a new plant the method is referred to as **division**.

(PowerPoint Slide #5)

- A. **Bulbs** are shortened underground stems that are enclosed with fleshy leaves. After several growing seasons, bulbs of daffodils, tulips, and lilies split into two or more bulbs. These can be easily separated and each will grow into a new plant. In addition to splitting, bulbs also produce offset bulbs known as **bulblets**. The numerous bulblets grow around the large bulb and can be carefully separated from the parent bulb to be planted to grow on their own.

(PowerPoint Slide #6)

- B. **Corms** are globe-shaped, fleshy underground stems. They are shorter and broader than a bulb. Corms increase in size during a growing season and may be cut into two or more pieces which are each capable of growing into a new plant. Small corms (cormels) often form around the corm. These small corms may be separated and planted to produce plants. Gladiolus and crocus are examples of plants that produce cormels.

(PowerPoint Slide #7)

- C. Rhizomes and tubers are underground structures that can be lifted from the soil, then cut or divided into pieces that will produce a new plant. **Rhizomes** are underground stems that grow horizontally just below the soil surface. Iris and lily-of-the-valley may be propagated by dividing their rhizomes into sections. Each section must have an 'eye' or node that will produce roots for the new plant.

(PowerPoint Slide #8)

Tubers are underground stems similar to rhizomes, except that the 'eye' or node produces new shoots instead of roots. Potato, dahlia and gloxinia are plants that produce tubers which may be used to propagate new plants.

(PowerPoint Slide #9)

- D. The **plant crown** is the part of the plant at the soil surface from which new shoots or leaves are produced. Many herbaceous perennials and houseplants are lifted from the soil and the crown divided into sections which become new plants. The African violet is an example of a plant propagated by division of the plant crown.

****Use TM: E4-1 to discuss the unique vegetative structures of plants (bulbs, corms, tubers and rhizomes) that may be used to propagate certain plants. Show students as**

many examples as you can find. Use TM: E4-2 or PowerPoint Slide # 10 to illustrate separation of bulbs and corms. Have students dig bulbs if possible. Separate bulbs and replant. Use TM: E4-3 to illustrate the separation of the crown of a plant. Bring to class lilies or other perennials that form a clump or crown plant. Separate the crown and replant the individual new plants.

Objective 2: Describe layering and identify four common forms of layering.

(PowerPoint Slide #11)

II. Layering is a simple method of asexual propagation in which roots are formed on a stem while it is still attached to the parent plant. The parent plant supports the new plant during root development until the new plant can function on its own.

(PowerPoint Slide #12)

- A. **Simple layering** is accomplished by bending a branch to the ground, slightly cutting or wounding the stem (branch), and covering the wounded portion with 5 to 7 centimeters of soil. The wounded area will form a callus and then produce new roots. After new roots have formed, the plants are removed from the parent plant. Honeysuckle and spirea are examples of shrubs that can be propagated using this method.

(PowerPoint Slide #13 shows a picture of simple layerage)

(PowerPoint Slide #14)

- B. **Trench layering** involves a shallow trench that is dug near the parent plant. An entire branch is bent over, placed in the trench, and then covered with 5 to 12 centimeters of soil. After a few weeks, roots will develop along the stem and new shoots will form at each node. When the new plants reach the desirable size, they are separated from the parent plant. This method often produces many new plants and is used for fruit (apple and pear) and nut trees that do not easily propagate from cuttings.

(PowerPoint Slide #15 shows a picture of trench layerage)

(PowerPoint Slide #16)

- C. Ornamental shrubs, roses and gooseberries are examples of plants frequently propagated by mound layering. To perform **mound layering**, the grower severely prunes the parent plant to a 5 to 10 centimeter stump that is then covered with soil. The mounded shrub is left undisturbed until the following spring when roots will have developed at the base of each stem. The newly rooted plants can then be separated from the parent plant.

(PowerPoint Slide #17 shows a picture of mound layerage)

(PowerPoint Slide #18)

- D. **Air layering** involves removing a portion of the bark on a stem. Root inducing hormone is applied to the cut area and moist sphagnum moss placed over the exposed area. Then plastic is wrapped and tied around the moss. After roots develop, the top part of the plant is cut just below the rooted area. The new plant is then potted to grow on its own. Many houseplants can be propagated by air layering.

(PowerPoint Slide #19 shows a picture of air layerage)

****Use TM: E4-4 to discuss the various methods of layering that are used to propagate plants. Bring into the classroom potted young plants found in your area that can be used in demonstrating simple layering. Use TM: E4-5 to demonstrate the technique for**

air layering. Use houseplants for a student activity to propagate new plants using the method of air layering.

Review/Summary: Use the student learning objectives to summarize the lesson. Ask the students to explain the response to the anticipated problem of each objective. Student responses can be used to determine which objectives need further review. There are also questions on PowerPoint Slides #20 and #21 that can be used as a review.

Application: Application may involve the following student activity. Students may propagate a variety of plants using separation, division and layering.

Evaluation: Evaluation should focus on student achievement of the objectives of this lesson. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

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

Part Two: Completion

1. separation and division
2. the roots on the new plant are well established.
3. node
4. fruit and nut trees

Part Three: Short Answer

1. In simple layering, a branch is bent to the ground and covered with soil. In air layering, the bark is removed from the stem, a root inducing substance is applied, sphagnum moss is placed over the exposed area, and the area is protected with plastic.

Sample Test

Name _____

Test

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Part One: Matching

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

- | | | |
|-------------------|-----------------|--------------------|
| a. bulbs | e. air layering | h. corms |
| b. division | f. plant crown | i. rhizome |
| c. separation | g. tuber | j. trench layering |
| d. mound layering | | |

- _____ 1. Cutting a vegetative plant structure into sections to produce new plants.
- _____ 2. Short underground stem covered with fleshy leaves.
- _____ 3. Removing a portion of the bark and inducing new roots to develop in order to propagate a new plant.
- _____ 4. An underground stem that grows horizontally and produces roots at nodes to form new plants.
- _____ 5. A globe shaped, fleshy underground stem.
- _____ 6. An underground stem that produces shoots from nodes along the stem.
- _____ 7. Propagation of new plants by pruning the parent plant to a short stump that is then covered with soil.
- _____ 8. Placing a branch of the parent plant in a shallow trench dug near the plant.
- _____ 9. Propagation method in which natural structures are removed from the parent plant and planted to grow on their own.
- _____ 10. The part of the plant at the soil surface from which new shoots or leaves are produced.

Part Two: Completion

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

1. Bulb producing plants are commonly propagated by _____ and _____.
2. Plants produced by air layering are removed from the parent plant when _____.

3. When dividing tubers or rhizomes it is important that each section contain an 'eye' or _____.

4. Examples of plants propagated by trench layering are _____ < and _____ trees.

Part Three: Short Answer

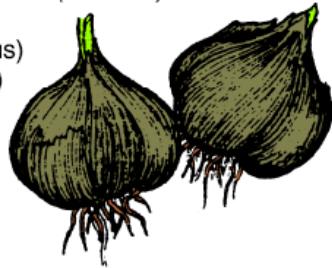
Instructions. Provide information to answer the following question.

1. Contrast simple layering and air layering.

TYPES OF FLESHY-ROOTED PLANTS

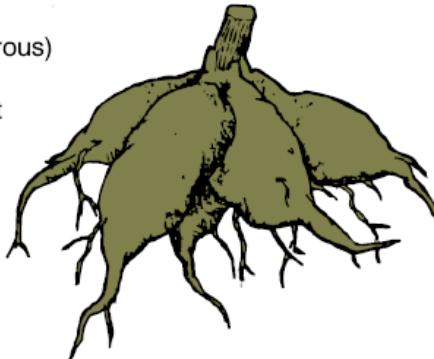
Bulbs

Amaryllis
Glory of the snow (*Chionodoxa*)
Grape hyacinth (*Muscari*)
Hyacinth
Iris (bulbous)
Lily (*Lilium*)
Scilla
Snowdrop
Trout lily
Tuberose
Tulip



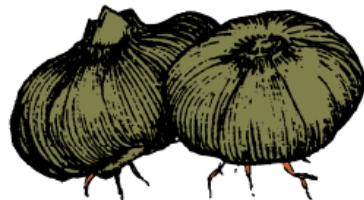
Tubers and Tuberous Roots and Stems

Anemone
Begonia (tuberous)
Black callus
Bleeding Heart
Caladium
Cyclamen
Dahlia
Desert candle
Gloxinia



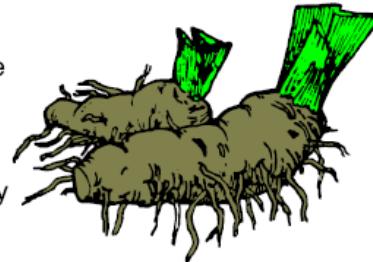
Corms

Crocus
Colchicum
Freesia
Gladiolus
Tritoma

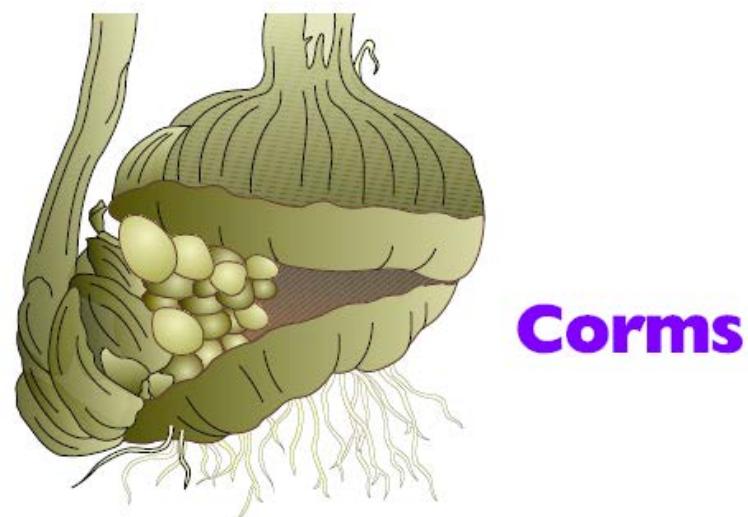
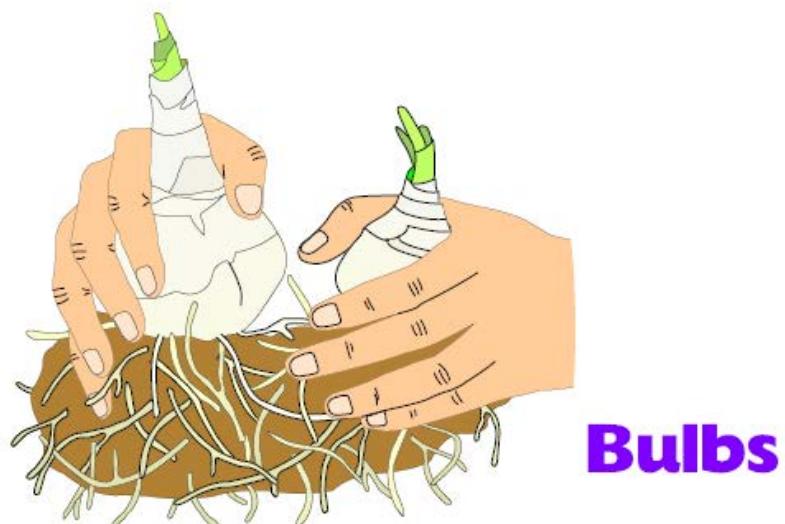


Rhizomes

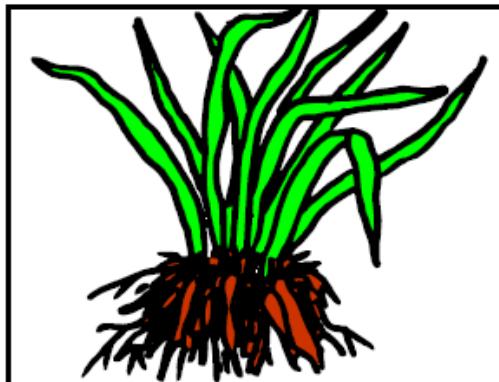
Bird of paradise
Canna
Calla lily
Iris
Lily-of-the-valley
Mint
Rhubarb



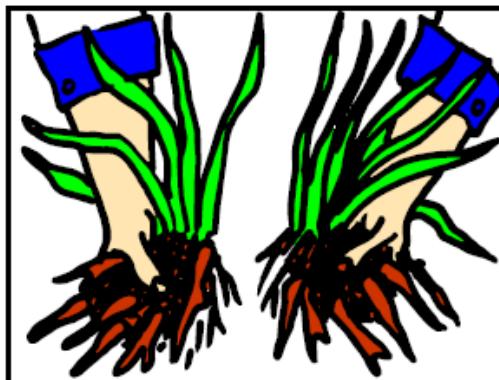
SEPARATION OF BULBS AND CORMS



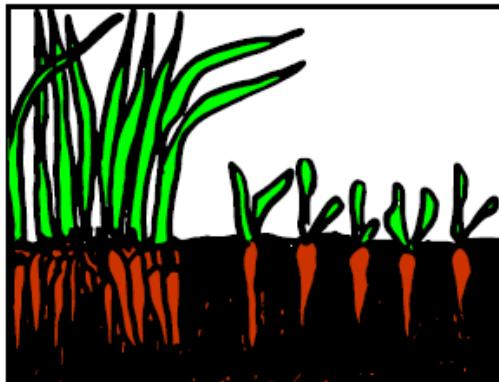
DIVISION OF PLANT CROWN



Some plants can be propagated by simple division of the plant crown.

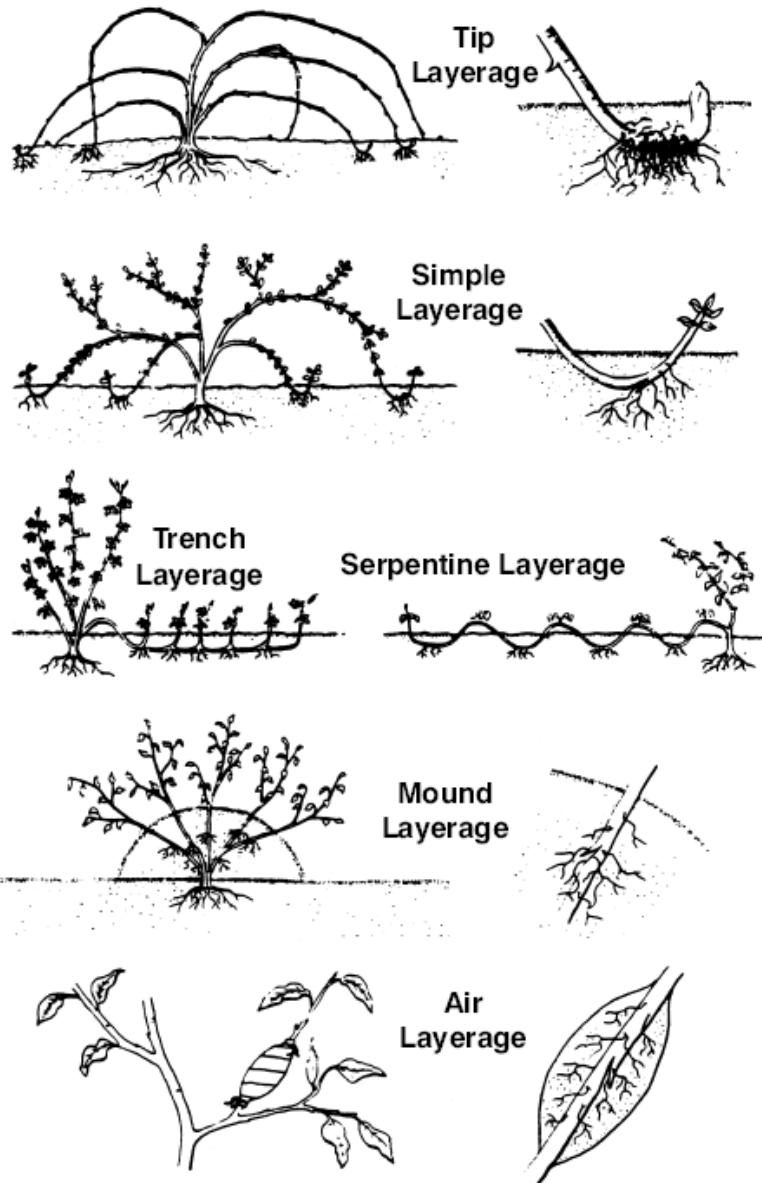


The crown of the plant is divided into sections.



Each section is complete with new shoots and roots. These sections are planted to grow into new plants

METHODS OF LAYERAGE



AIR LAYERING

