

**HANDS-ON LAB**

# Plant Propagation and Asexual Reproduction

Farmers, horticulturalists, and gardeners all take advantage of asexual reproduction in plants to increase numbers of strong and healthy individuals. A new plant produced by asexual reproduction is genetically identical to its parent; it is a replica or clone of the parent plant.

The many methods of asexual, or vegetative, propagation include grafting, tissue culture, division, layering, and growing leaf or stem cuttings. Grafting is the joining of parts from two plants so that they will grow as one. This sometimes occurs in nature when adjacent trees grow together; mostly, though, it is performed by horticulturalists who wish to increase plant strength, control the size and shape of a plant, or induce trees to bear fruit at a certain time of the year. Tissue culture is the separation and manipulation of plant cells under special conditions so that they each produce a new plant. This can generate many plants in a short time. Grafting and tissue culture are usually done by specialists.

Division, layering, and growing cuttings can all be done by amateur gardeners. Division is the splitting of a clump of plants or the separation and growth of bulbs or tubers (fleshy roots) with sprouts from an established plant, as shown here:

**MATERIALS**

- container (3)
- knife
- marker
- newspaper (to line workspace)
- plant
- scissors
- soil, 2 cups
- spade, small
- tape, clear, 10 cm
- water, 200 mL



Layering involves burying part of the parent plant (still attached, as illustrated below) so that it forms new roots and shoots. Then, this new plant is separated from the original and grown on its own.



When growing cuttings, pieces of the original plant are removed and placed in water or a growth medium (soil or vermiculite) with the intent of growing an entirely new plant. Leaf cuttings are full leaves or parts of leaves that are separated from the parent plant and stem cuttings are long pieces of stem, with leaves attached if possible.



You have been hired to work at a plant nursery. Many of the plant species sold at this nursery are propagated vegetatively. Part of your job is to determine the best growing conditions for these plants.

### PREDICT

How do various environmental conditions affect the vegetative propagation of plants?

---

---

---

### PROCEDURE

1. Choose one of the following means of vegetative propagation to investigate: division, layering, growing leaf cuttings, or growing stem cuttings. You might also try growing a cutting from a different area of the plant (such as roots or flowers).
2. Form a hypothesis about your propagation methods and the effect of a chosen variable on the generation of new plants. You might choose to test the effect of light, moisture, or fertilizer. Write your hypothesis in the space provided.

---

---

---

3. Design an experiment to determine how the condition you chose affects the propagation of your plants using the method you chose. Remember that a valid experimental design includes a control, constants, and repeated trials. Use the space below to record what condition you will investigate and what method of propagation you will use. Write your procedure in your Evidence Notebook.

---

---

---

---

Name:

Date:

4. Get your experimental design approved by your teacher before you begin.
  5. Set up your experiment. Don't forget to label your plants with their names, your initials, and the date. Line your work area with newspaper for easier cleanup.
  6. Water your plants as you called for in your experimental design.
  7. After a week, check for root or shoot formation from any new plants every 1 to 3 days. Record your observations in the Data Table.

## OBSERVATIONS

## DATA TABLE: OBSERVATION OF NEW PLANT GROWTH

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## ANALYZE

1. What were the independent and dependent variables in your experiment?

---

---

---

2. How might environmental factors have influenced development of the new plants?

---

---

---

---

3. What are the advantages of asexual propagation, compared to propagation using sexual reproduction?

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

4. Based on your observations, what can you conclude about the propagation technique you used for your plant?

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

5. Were you able to accept or reject your hypothesis? Use evidence to explain your answer.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Name:

Date:

## **EXPLAIN**

Explain how genetic engineers could use information from your experiment to develop plants that are less susceptible to the condition you tested. How might cloning be utilized in developing new plants or in testing the success of engineered plant strains? Use evidence from your investigation to support your claims.