

Plant Reproduction: part 1, asexual propagation

Grade: 7

GPS: S7L3. Students will recognize how biological traits are passed on to successive generations.

- b. Compare and contrast that organisms reproduce asexually and sexually (bacteria, protists, fungi, plants & animals).

Essential Question: How do plants reproduce?

Teacher Note: Ideally this lesson should be taught after students have already been introduced to the idea of sexual and asexual reproduction. Mix and match asexual propagation techniques in the lab portion to fit your time, needs, and resources. This lesson does require a knife (a scalpel from dissecting kits should suffice) for a couple of methods. If this is a problem in your school, you might only want to demonstrate those methods.

Interest Approach: Tell students to imagine they are working in the school garden. Suddenly, they see the most amazing strawberry (or whatever is seasonally appropriate); red as a ruby, juicy, and twice as big as a normal strawberry. Looking closer, every berry on that one plant looks just as delicious. They can't wait a moment later, and giving into temptation, they eat one, and it is the best thing they have ever tasted. They decide strawberries like this should be shared with the world (after they've had their fill of course). Ask students to take a few seconds and brainstorm ideas of how to get more strawberry plants exactly like this one.

Talk about student ideas, and explain that one way to reproduce that amazing fruit is through asexual propagation, and although that is not a viable method for every garden plant, it is a very important to the agriculture industry and home gardeners alike.

Lesson: Review the difference between sexual and asexual propagation. Tell students that you are going to be practicing some methods of asexual propagation to grow plants for your school garden. Instruction for various propagation methods are listed below. The teaching portion of this lesson should be spent demonstrating the propagation methods that you intend to have students perform. Make sure to go over safety and group rules.

Learning Activity: Below are instructions for propagating various fruits, vegetables, and garden plants. This can work as a lab rotation, or students can spend part of each class period for several days practicing different methods. Mix and match based on garden needs/resources/season.

Asexual Propagation Lab

Tubers

Potatoes are a great garden example of a **tuber**. A tuber is a specialized root. To propagate potatoes, first, locate the eyes. They will look like small indentations on the surface of the potato. This is where new potatoes will sprout.

1. To propagate potatoes, carefully take your knife and cut your potato into four or five pieces. Each piece should have one to two eyes.
2. Put your potatoes on a sheet of notebook paper and write names of all group members.
3. Then take your potatoes to the area designated by your teacher. There, they will dry for a couple of days. Once the fresh cuts have developed a thick skin, they will be ready to plant.

Tuber Slips

Tuber slips are propagated primarily with sweet potatoes.

1. Cut the end off of a sweet potato tuber
2. Insert several toothpicks around the side. Fill a glass with water. Place the sweet potato with toothpicks on top of the glass. The cut side of the potato should be facing down, and should be covered with water.
3. Label your glass with group member's names, and the date.
4. Wait until the eyes of the sweet potatoes send out sprouts. When the slips become several inches long, cut them at the eye and then plant them.

Stolon (runner)

Stolons, or runners, are horizontal shoots that develop roots and a new plant from a parent plant. Strawberries are an example of plants that have runners. To propagate a strawberry plant, you will 1.) place a new runner in a small pot, cover with soil, then detach from the plant when rooted or 2.) gently dig up an already rooted runner.

1. First look at your strawberry plant and identify the runners. They will be much longer than your usual strawberry leaf stems, and will not have any leaves on the middle of the stem. Once you have found one, carefully examine the end. Does it already have roots, or is it sitting on top of the soil?
2. If it is a new shoot still sitting on the soil, fill your pot almost to the top with soil.
3. Place the pot under the end of the runner, and put ½ in. of soil on top of the runner.
4. Make sure to water the pot.

OR

1. If the stolon already has roots, use pruning shears to cut the stolon.
2. Then, use a spade to carefully dig up the rooted strawberry. Make sure to get as many roots as possible, digging a couple of inches from the base.
3. Label the pot with your group members names and the date.

Division

Some plants, such as daylilies and irises, grow in clumps. Each year the plants spread and the clump gets larger. These clumps can be divided to get many individual plants.

1. Grab a section of plants that your teacher has dug up from the school garden.
2. Gently pull the individual plants apart. If needed, use a spade to cut the roots where they are too tangled to separate. Remember, all of the plants survival depends on leaving as many of the roots as possible.
3. Once a plant is divided, plant in a pot. Label the pot with your group members names and the date.

Cuttings

Cuttings are the most common type of asexual propagation. When taking cuttings, a gardener plants part of a stem. The underground portion grows roots, and the stem becomes a new plant. Generally, cuttings are taken from perennials, because annuals

Herbaceous Cuttings

Herbaceous cuttings are taken from plants with soft stem tissue – less like trees and shrubs and more like flowers or new growth on any plant. These cuttings are very easy to take. Examples of plants you could use for herbaceous cuttings from your school garden include most perennial herbs and flowers.

1. Simply cut the plant slightly above the **node**, the place on the stem where a leaf buds out from the stem. Ideally your cutting should be 4-5 inches
2. Take the bottom two-thirds of leaves off.
3. If available, dip the stem into rooting hormone. This will encourage rapid root growth.
4. Place 1/2 of the stem in the soil.
5. Make sure the soil is moist. Keep plant in a humid, warm environment. Do not allow plant to dry out or become too hot.

Woody Cuttings

Woody cuttings are similar to herbaceous cuttings except these stems are more similar to trees or shrubs. Use woody cuttings to propagate fruits like blueberries or blackberries, or ornamental shrubs.

1. Simply cut the plant slightly above the **node**, the place on the stem where a leaf buds out from the stem. Ideally your cutting should be 4-5 inches
2. Take the bottom two-thirds of leaves off.
3. Using a sharp cutting tool, cut several strips lengthwise down the bottom half of the stem.
4. If available, dip the stem into rooting hormone. This will encourage rapid root growth.
5. Place 1/2 of the stem in the soil.
6. Make sure the soil is moist. Keep plant in a humid, warm environment. Do not allow plant to dry out or become too hot.

Check for Understanding:

After the lab is completed, have students answer the following questions: (make sure you go over these as you are discussing and demonstrating propagation techniques)

1. How do the plants you propagated today compare genetically to the parent plants?
2. What are some benefits to asexual propagation?
3. What are some potential problems with asexual propagation?
4. What conditions do your plants need to root successfully?
5. Which plants do you think will have the best survival rate?

Answers:

1. The plants propagated today are genetically identical to the parent plants
2. Benefits of asexual propagation include quick reproduction, the plants are identical to the parent plants so you can propagate excellent plant specimens.
3. Because the plants are identical, the lack of diversity can make plants susceptible to disease.
4. Conditions need to be warm and humid, and soil needs to remain moist for cuttings to root.
5. The plants that already have roots should have the best survival rate.