



## Propagation & Regeneration in Plants

**Grade Level:** 2 - 9

**Essential Skills:** 1, 5, 9

**NGSS:** 2-LS2-1, 3-LS4-3, 4-LS1-1, 5-LS1-1, MS-LS1-5, MS-LS2-5, MS-LS1-4, HS-LS2-4, HS-ESS3-2

**CCSS:** WHST.6-8.1, WHST.6-8.2, SL.8.1,

**Math:**

**Time:** 1 class period to set up and approximately 1-3 weeks to observe.

**Materials:**

- Knife
- Cutting board
- Water
- Cloves of Garlic
- Small glass jars
- Clear cups
- One bunch of celery per experiment
- Clear tray or shallow dish
- 5-6 beets with greens
- Clear jar
- Fresh basil cuttings

**AITC Library Resources:**

**More Lessons:**

- Fertilizers and the Environment
- Know your Nitrogen
- Soil Horizons & Oregon's State Soil
- Water Filtering and Soil
- From Rocks to Soil
- Earth as an Apple & Soil Conservation
- Monocots & Dicots

### Description:

While most plants grow from seeds, many can also be grown from bulbs, tubers or stem cuttings. This is called vegetative propagation. It is used in agriculture for growing many types of plants in the nursery and greenhouse industry, as well as for raising crops like potatoes and garlic. Plants are also capable of regeneration, meaning they have the ability to regrow lost or damaged anatomical parts. For example, after a tree is cut down, overtime, shoots often emerge from the stump. In this lesson, students will set up a series of observation stations. Then they will observe how the plants growth and record their findings over the period of a few weeks.



### Background:

**Vegetative Propagation** is a form of asexual reproduction where new plants develop without the production of seeds or spores. Instead a new plant is formed from bulbs, tubers or cuttings of the parent plant. Propagation is often a fast and easy way to raise plants such as perennial root crops, vines and some trees. Propagated plants are clones of the parent plant and therefore the quality is more predictable than plants raised from seed.

### Directions:

Set up each station below, students will then record observations on the development and growth of the plant. To expand this lesson, set up multiple versions of each experiment and compare the growth effects (i.e. light exposure, temperature, moisture levels, etc.).

### Part I: Garlic Bulbs (Propagation)

1. Peel several cloves of garlic, being careful to get the whole clove.
2. Tightly pack the cloves of garlic into a small clear container
3. Cover three-fourths of the cloves with water.
4. Water will need to be changed daily.

**Teacher Note: The first signs of growth should begin in 1-2 days. See photo above; growth after one week.**

### Part II: Celery (Regeneration)

1. Cut the stalks off a full bunch of celery about three inches from the base.
2. Place the celery base into a shallow bowl of water.

**Teacher Note: Leaves should start to grow out of the center of the stalk in about one week.**



### Part III: Beets (Regeneration)

**Fun Fact:** Both the tops and bottoms of beets can be eaten. In this experiment you will grow new beet greens.

1. Cut the greens off the top of a fresh beet, leaving about 1/4" of the stem showing.
2. Cut the bottom of the beet off, leaving a disk about 1/2" thick.

3. Place the remaining beet disk, stem side up in a shallow dish of water. Keep the bottom of the cut end covered with fresh water, but do not cover the top part where there were leaves.

**Teacher Note: New beet leaves will start to grow from this disk and can be harvested to add into salads. The beet greens will continue to grow back if you harvest the larger leaves first. (see next page for photos)**



Beet images on this page via oldschool.com

#### **Part IV: Basil and Mint (Propagation)**

1. Take a three to four inch cutting from a basil or mint plant right below a leaf node.

2. Gently remove the lower leaves on the stem, leaving the two smallest at the top.

3. Place the cuttings in a glass of water and put it where it can get plenty of sunlight. Use a clear container so you and your students can watch your cutting grow roots.

4. Keep the water fresh and make sure it covers the stem of the cutting. After a week in water new roots should appear. Once the roots on the cutting are two inches or longer, they are ready to transplant into soil. This experiment could be extended to compare cuttings from a living plant, to cuttings from fresh herbs purchased at a grocery store.



#### **Part V: Sweet Potatoes (Propagation)**

The process of propagating new vines from a sweet potato will take longer than the other methods listed, it will prove to be an interesting, long-term experiment.

1. Cut the sweet potato in half and insert three toothpicks midway into the halved potato

2. Rest it in a shallow vase of water with the cut portion of the potato resting in water and the upper half exposed to sunlight.

3. After about two weeks, shoots will sprout from the top, each one of these will become their own plant. Roots will also grow from the base of the potato. The sprouts are called slips. Once they are about five inches tall they can be removed from the top of the sweet potato and will develop into their own sweet potato vines.

4. To remove the slips, gently twist the longest and strongest sprouts where they met the base of the potato until they twisted off. As you twist off the slips, a hole is left in the potato flesh and a base is left on the bottom of the slip.

5. Put the slips in a shallow bowl of warm water, stem side down in the water and leaves out of the water.

6. Place them in a sunny area.

7. When the slips have developed 2" roots they can be planted in soil.



Images on this page via 17Apart.com