



## Rooting for Roots

### Lesson

#### Goals

Students will learn about different types of roots and the functions of roots.

#### Objectives

Students will be able to identify different roots that we eat and why we include them in our diet. They will also be able to identify different types of roots and explain their various functions.

#### Colorado Academic Standards

Science: Life Science

GR.2-S.2-GLE.2

GR.5-S.2-GLE.1

**Total Time** – 60 minutes and follow-up one week later

#### Materials

- Examples of roots (carrots, beets, radishes, daikon radishes, scallions, living lettuce, celery root, etc)
- 1 or 2 large carrots
- 5 or more clear plastic cups
- Radish and lettuce seeds
- Germination mix
- Rocks
- Water
- Journal
- Snack (see end of lesson)

#### Did you know?

Aspen trees that grow near each other often share the same roots. This makes Pando, an Aspen tree grove in Utah, the world's largest organism. It includes 47,000 stems and covers 107 acres. It is thought to be 80,000 years old.

#### Vocabulary

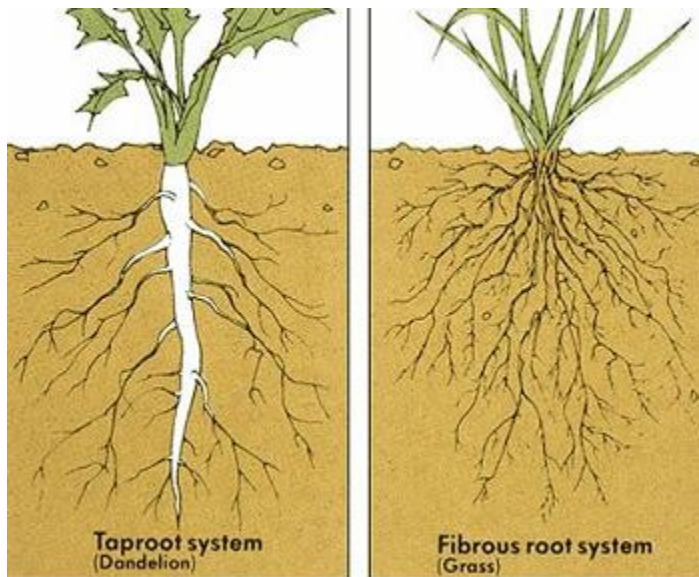
roots	functions	taproot
edible	fibrous	function
eroding	germination mix	hypothesis

#### Method

##### Introduction (15 minutes)

1. Review with the class the different parts of a plant (roots, stems, seeds, flowers, fruit and leaves). Go over any part that you have discussed in previous lessons. Remind the class that different parts of the plant all work together to make the plant grow and be healthy, just like in a community—all the different people in a community work together to make a community healthy and happy.
2. Have the class list all that they know about roots. Then have them list roots that are commonly eaten (carrots, radishes, beets, etc).

3. Discuss with the class the different types of roots, while showing examples (these can be brought in or you can pull them up online from the websites listed at the end of the lesson).
  - a. Taproots grow somewhat straight and vertically down. Plants with taproots are difficult to transplant. Edible examples include: carrots, beets and radishes. A non-edible example is a dandelion.
  - b. Fibrous roots are more of a mass of small, entangled roots that grow directly from the stem. Examples include: onions, lettuce, tomatoes, grasses and corn. They often remind the class of hair.



4. Once the class understands the difference between a taproot and a fibrous root, it is time to move on to the functions of the roots.
  - a. Roots anchor and provide support for the plant.
  - b. Roots absorb the water and nutrients necessary for plant growth.
  - c. Roots prevent soil from eroding.
  - d. Roots increase organic material and help with moisture retention as they decompose (acting like a blanket).
  - e. Roots store sugars and carbohydrates.

**Activity** (35 minutes)

1. Cut off 2" from the top of each carrot. Remove any old leaves. Place the carrot top cut side down in a plastic cup. Add water until the carrot is halfway covered. Place rocks around the carrot to hold it in place. Put the bowl in a bright place, but not too sunny or too hot. Make sure there is always water in the container.
2. Have the class predict what will happen to the carrot. Have the students write their predictions in their journals. Why do they predict that? (Soon feathery green leaves will emerge. Since the carrot is only 2", the plant will eventually die because it does not have enough food.)
3. Break the class up into four groups. Have each group fill a plastic cup with germination mix.

4. Give group one ten radish seeds to place on top of the germination mix in their plastics cups. Have group two do the same with only three radish seeds. Group three will get ten lettuce seeds and group four will get three lettuce seeds. Have each group try to place some of the seeds near the edges of the container so they can watch the roots grow.
5. Lightly sprinkle germination mix over the seeds. Label each cup.
6. Water the seeds and place in a warm sunny location.
7. Have the class write in their journals what they will predict will happen in each cup and why. (Within a week the seeds will germinate and begin to grow. Initially the cups with ten seeds will look wonderful, but over time these cups will fail because they do not have enough room for the roots to develop. The radishes will develop taproots and the lettuce will develop fibrous roots.)
8. Follow-up: Continue to fill carrot container with water and keep seeds moist. Check on them regularly. A week or so later, have the class check their predictions and see if they were right.

### **Conclusion** (5 minutes)

Have the class write in their journals one cool new fact they learned about roots today and their favorite root and why.

### **Snack** (5 minutes)

Hand out the Root Vegetable Salad with Parsnip Puree and discuss the different roots the class is eating.

### **Assessment Tools**

- Journals
- Participation

### **Modifications**

- Check out the following websites and share the images with the class.

- Information about Pando, the world's largest organism:

<http://watchingtheworldwakeup.blogspot.com/2008/08/unbearable-lightness-of-aspen-part-1.html>

- Images of the largest and heaviest carrots:

<http://www.carrotmuseum.co.uk/record.html>

- Have the students illustrate in their journal one example of a tap root plant and one example of a fibrous root plant

### **Extensions**

- Have the students hypothesize why certain plants have taproots while others have fibrous roots in journal.

## **Root Vegetable Salad with Parsnip Puree**

- 2 carrots
- 2 parsnips
- 2 turnips
- 1 bunch of radishes
- 1 jicama
- 6 oz arugula
- 1 oz lemon juice
- 3 oz olive oil
- 2 garlic cloves
- 1 or 2 oz milk or water
- salt and pepper to taste

Preparation (1 hour): Chop parsnips. Rub parsnips and garlic cloves with a little olive oil. Wrap in aluminum foil. Place in 400 degree oven for 45 minutes or until cooked through. Place parsnips and garlic in blender and puree with milk (or water) until smooth. Season with salt and pepper and set aside. Make a simple vinaigrette by whisking the olive oil and lemon juice together. Season with salt and pepper. Grate the carrots and thinly slice the radishes and turnips. Peel and julienne the jicama. Combine carrots, radishes, turnips and jicama with arugula. Toss the ingredients with vinaigrette. Serve on top of a the parsnip puree.

### **Source**

Recipe courtesy of Corey Ferguson

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