

# The Proof is in The Water

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## Standards of Learning

Science 6.5

## Objective

Students will:

- investigate which plant material contains the most water.

## Materials

- Triple beam balance or digital balance
- Grass clippings
- Pears
- Celery stalks
- Carrots
- Newspaper
- Data Table

## Background Knowledge

The rate of water loss (transpiration) depends on evaporation. Therefore anything that affects the rate of evaporation would also affect the rate of water lost. Some of the factors that affect this in plants are as follows:

**Humidity in Air:** The inner cellular spaces within the leaf are usually over filled with water vapor. If the air outside is dry, water vapor from the leaf will spread out at a faster rate. Thus the rate of transpiration would be greater. If the air outside is humid evaporation will be hindered and the leaf will transpire less. Assuming, the other factors are constant, the rate of transpiration decrease with increasing humidity.

**Temperature of the Air:** Leaves transpire more in hot weather conditions.

**Strong Wind:** As leaves lose water due to transpiration, the air outside gets damp. If a wind is blowing, this water vapor gets blown away, making the air around the leaf less damp. A leaf loses more water in high winds. However, if the wind is blowing too fast the stomata may shut down to prevent too much loss of water.

**Light:** Since light affects the size of the stomata of the leaf. It therefore also has an affect on the rate at which a leaf loses water. During the day, the stomata get wider. This increases the rate of transpiration. At night, the stoma closes down.

Review plant part definitions with students.

- Roots – usually the underground part of a plant that absorbs water and nutrients and can also store food; means of anchorage and support for plants
- Stems – the main trunk of a plant that supports and carries water and nutrients to the rest of the plant
- Leaves – the outgrowth from the stems whose main function is to produce food for the plant through photosynthesis
- Flowers – the parts of the plant that hold the reproductive organs
- Fruits – the fleshy part of the plant that holds the seeds
- Seeds - the fertilized ripened ovule of a flowering plant containing an embryo and capable normally of germination to produce a new plant

Review edible plant parts with students, show fresh, artificial or illustrations.

- Roots – carrot, radish, beet, turnip, parsnip, sweet potato



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- Stems – celery, asparagus, potato (fleshy underground stem called a tuber), rhubarb, cinnamon
- Leaves – lettuce, cabbage, spinach, onion (bulb), garlic (bulb), parsley, dill, rosemary, thyme, sage, collards, brussel sprouts
- Fruit – tomato, cucumber, squash, apple, peppers, eggplant, pears, avocado, peach, green beans
- Flowers – broccoli, cauliflower, artichoke, capers
- Seeds – corn, peas, peanuts, black-eyed peas, kidney beans, pinto beans, black beans

### Procedure

1. Divide class into groups of 3 or 4.
2. Give each group a handful a grass clippings, a pear, a celery stalk, a carrot, a newspaper and a data table.
3. Have each group put their names on the newspaper.
4. Have each group weigh the grass clippings and place on the newspaper. Record on data table.
5. Have each group weigh the pear, then you cut it into four pieces (or you can designate a student to cut it) and place it on the newspaper. Record on data table.
6. Have each group weigh celery stalk, then you cut it into strips (or you can designate a student to cut it) and place it on the newspaper. Record on data table.
7. Have each group weigh carrot, then you cut it into strips (or you can designate a student to cut it) and place it on the newspaper. Record on data table.
8. Answer discussion questions 1 & 2 and explain that question 3 will be answered tomorrow. DAY #2. Repeat steps 4-7, but you do not have to cut anything all you have to do is weigh, record and calculate total water loss and percent water.
9. Once calculations are done, answer discussion question #3.
10. Also discuss what part of the plant that each part belongs to grass is a leaf, pear is a fruit, celery is a stem, and carrot is a root. Does the part have any affect on the amount of water it contains?
11. Discussion questions:
  - Why was it necessary to cut the items into strips?
  - Which material do you think contains the most water?
  - Which material contained the most water?

### Extension

1. Based on this lab, do different parts of the plant contain more water than others? Why might this be so?
2. Have students design another lab using other plant parts to prove water content.

	Fresh (g)	Dried (g)	Total Water Loss (g)	Percent Water
Grass				
Pear				
Celery				
Carrot				

To do Percent Water:  $\frac{\text{Total grams of water lost} \times 100}{\text{Weight of Fresh}}$

