

Topic 7: Plants – 7b. Yam Lab

Resources: Miller, K., Levine, J. (2004). *Biology*. Boston, MA: Pearson Prentice Hall.

What is the difference between sweet potatoes and yams? [Internet]. Everyday Mysteries. The Library of Congress. 23 Oct. 2009. Available from: <http://www.loc.gov/rr/scitech/mysteries/sweetpotato.html>

Schultheis, J., Wilson, L. What is the difference between a sweet potato and a yam? [Internet]. North Carolina State University, North Carolina Cooperative Extension Service. Revised Sept. 1993. Author reviewed Jan. 1998. Available from: <http://www.ces.ncsu.edu/depts/hort/hil/hil-23-a.html>

Building on: *Botany*, the study of plants, becomes more interesting when students witness it. This lab will cover plant *dormancy*, *storage of energy*, *growth*, *meistematic tissue*, *external influence* on growth, and *identification* of a plant.

Links to Chemistry and Physics:

Experimental design
Potential versus kinetic energy
Growth and energy
Gravitational influence and geotropism

Stories: Yams and sweet potatoes may look similar, but they are different plants all together. Sweet potatoes are dicots from the morning glory family. The sweet potato you eat is considered a storage root. They tend to be slightly sweet and moist. They range in color and hardness and are native to South America. They are now grown abundantly in the United States. Yams are monocots and are more closely related to lilies and grasses. They are starchier and drier to the taste than sweet potatoes. The yam that you eat is considered a tuber. They are native to Africa and 95% of all yams are still grown in Africa.

The African name for yam is nyami; the name we use is a shortened version of the African name. When soft sweet potatoes were introduced to the southern U.S., they were confused with yams. Now the U.S. Department of Agriculture requires that labels with the term “yam” must also include the term “sweet potato.”

Most true yams in the U.S. are bought canned and fresh yams are only found in international grocery stores.

Materials:

- Yams (sweet potatoes)
- Large plastic drink cups
- Toothpicks
- Grow lights
- Digital balance
- Permanent marking pens available (if they want to mark to see from where the stem grows)

Instructions to Teachers for the Lab:

The students will really be working with sweet potatoes. Large bags of these can be purchased in many grocery stores. Ideally, you want one sweet potato for every two students. We learned the hard way that something is put on the sweet potatoes to keep them dormant, so it is important that the students thoroughly wash the potatoes off with soap and water when they set up the lab. It is also a good idea to change the water every day. Some of the potatoes suffer from rot, in which case those students will have to share data with another group.

Large plastic drink ups are perfect for holding the potatoes. The grow lights can be ordinary light bulbs or fluorescent bulbs.

Students are not allowed to go to their potatoes at the beginning of class; they can drag that out for half the period if given the chance. They are given the last five minutes of the class to observe, record, and manipulate their potatoes as they see fit.

It takes about one to two weeks for the potatoes to begin to sprout. It seems to be very dependent on the temperature in the room (including the night-time temperature when many schools lower the thermostat). You should plan to have these potatoes run for about six weeks total.

I was surprised by how many students had never grown sweet potatoes when they were in elementary school. They had no idea what was going to happen. As the potatoes progressed a lot of students got very attached to their potato. I had one very big, very cool football player that got so excited, that when the lab was over, he took his potato home!

Name _____

Yams! Yams! Yams?

You will be growing, observing, and experimenting with your yam over the next few weeks. Don't know much about yams? You will when you get through!

Procedure:

1. Obtain a yam, a cup to grow it in, and three toothpicks.
2. Mass your yam and record the mass on your journal for day one.
3. Take the three toothpicks and stick them into the yam. They should be inserted about halfway down the yam and oriented so that the toothpicks stick out in three different directions and they will rest on the edge of the cup, keeping the yam only halfway submerged. The toothpicks should be inserted about 2 cm into the yam.
4. Write your names and class period on your cup with a permanent marker, and then set the yam into the cup.
5. Fill the cup with water to approximately 3 cm from the top.
6. Set your yam and cup under the grow lights.
7. Now look at the hypotheses. Write your hypothesis for each question and be sure to include your reasoning for your answer. Please use complete sentences.
8. Go back through the hypothesis questions and beside each number indicate how you plan to determine the answer using the following key:

O = Observations

E = Experiment

R = Research literature

You may use more than one letter for a hypothesis question!!!!!!

9. Construct a journal that can be used as you observe and note changes in your yam. Use the following format:

Date	New Changes in the Yam	Length of Shoots (cm)	Length of Shoots (cm)
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Hypothesis Questions:

- _____ 1. Which will grow first: the roots or the shoots?
- _____ 2. From which part of the yam do you expect to see roots first: the part toward the tip end of the yam or closer to the middle of the yam?
- _____ 3. From which part of the yam do you expect to see shoots first: the part toward the tip top of the yam or closer to the middle of the yam?
- _____ 4. Will you be able to predict where a shoot will branch? How?
- _____ 5. Will the yam itself lose mass as it grows (this does not include the leaves, shoots, and roots)?
- _____ 6. If you cut off a part of a mature shoot, does the shoot attached to the yam stop growing? Can you put the shoot you cut off into water and will it continue to grow?
- _____ 7. Will the roots of the yam have root hairs (little fuzzy side roots)?
- _____ 8. From what point on a stem does the growth occur: the end of the stem next to the yam or the tip end of the stem?
- _____ 9. Will the leaves of the yam have parallel veins like those in a blade of grass, or netted veins like those seen in a maple leaf?
- _____ 10. Is the yam itself a root, a stem, a tuber, a bulb, or a corm?
- _____ 11. Are yams and sweet potatoes the same thing? Is this a yam or a sweet potato?