Bulbs: Potential Energy and Kinetic Energy

6th Grade Garden Lesson

SUMMARY

Energy is defined as the capacity to do work. We are going to discuss two basic forms of energy: Potential and Kinetic

- Potential Energy - stored energy (example: a ball resting on top of the hill)
- Kinetic Energy - the energy of movement (example: a ball rolling down the hill)

In the garden, we can see these two forms of energy at work. Photosynthesis is a good example. Plants absorb and convert light energy from the sun into chemical energy. The plants **store** this energy in the form of glucose, or sugar. This is an example of potential energy. These sugars are synthesized from carbon dioxide and water – hence the name *photosynthesis*, from the Greek φῶς, *phōs*, "light", and σύνθεσις, *synthesis*, "putting together".[1][2][3] Oxygen is released as a waste product. Photosynthesis is largely responsible for producing and maintaining the oxygen content of the Earth's atmosphere, and supplies all of the organic compounds and most of the energy necessary for life on Earth.

Plants release the stored energy and use it to drive their own chemical reactions – growing! The process plants use to release the energy stored in sugar is called **CELLULAR RESPIRATION.** This is an example of kinetic energy.

Plants can also store the energy for the future. A bulb is a good example of that.

* Note: Energy is measured in units called Joules (J). One J = about 1/4 calorie; and one calorie is the amount of energy needed to raise the temperature of 1 gram of water by 1^{o}C (Celsius). The number of calories food contains tells us how much potential energy they possess. For example: The average adult needs to get approximately 2,000 calories from food to have enough energy to be healthy and live well.

BACKGROUND

Garlic and tulips are two examples of bulbs. Garlic is an edible bulb and tulips are a decorative flower. A bulb is a storage unit for a plant. Kind of like a refrigerator, it stores all the food the plant needs to overwinter, then grow and bloom into a flower in the spring.

Botanically speaking, a bulb is a modified stem containing a complete miniature plant, including embryonic leaf, stem, and flower parts, and surrounded by fleshy scales (which provide food for the young plant) and a basal plate (which produces roots). Bulbs are surrounded by a thin protective layer called a tunic. These layers are papery thin.

Garlic, tulips, daffodils, and onions are **true bulbs**. If you slice a bulb in half horizontally, you'll see rings formed by the scales, and if you are looking at one close to planting time, you'll see a small plant in the center. An onion that has started to sprout is a good example to show.

OBJECTIVES

Students will be able to give examples of potential and kinetic energy and understand that photosynthesis and cellular respiration are examples of potential and kinetic energy in the plant world. Students will understand that the purpose of a bulb is to store food for the plant and that inside the bulb is a complete miniature plant. Students will be able to give examples of true bulbs: Onions, tulips and daffodils

Students will learn the proper way to plant a bulb – pointy side up.

MATERIALS

- An onion
- 4 garlic heads
- A dried garlic flower head
- 15 tulip bulbs
- Garden trowels

PROCEDURE:

ENGAGE (10 minutes)

Gather all the students in the garden. Show examples of bulbs: onions, garlic and tulips. Explain that a bulb is a storage unit, kind of like a refrigerator. Cut an onion or tulip bulb in half and show the students the layers and the baby plant inside. Show the students that there is a top and a bottom. The top is pointy and the bottom is usually flat and has some dried roots coming out. We always plant the bulbs pointy side up, root side down.

Growing garlic from cloves is pretty cool. We are actually cloning the plant. When we separate the cloves and plant them, next year they will form into full heads! Show the class the dried bulbils (mini bulbs), and true seeds from a garlic flower cluster.

Planting garlic:

Carefully separate the heads into individual cloves. Try not to remove the protective outer layer (the tunic) on each clove. Plant each clove 2” in the ground, pointy side up, spaced 6” apart. Cover with straw.

Planting Tulips:
Get into groups of 3 or 4. Each group digs a large hole about 8” deep and 2 ft. around. Place bulbs in desired pattern, then cover with soil and pat lightly.

Fun Facts:

Garlic:
Originated in Central Asia. It’s been used for thousands of years for medicinal purposes as well as flavoring for foods. It is related to the onion. In Europe, many cultures have used garlic for protection or white magic, perhaps owing to its reputation as a potent preventative medicine. Central European folk beliefs considered garlic a powerful ward against demons, werewolves, and vampires. To ward off vampires, garlic could be worn, hung in windows, or rubbed on chimneys and keyholes.

Tulips:
Tulips originate in Asia. They were first cultivated in Turkey. Tulips are botanically related to lilies, but got their name from their resemblance to turbans (from Turk. tülbent "turban," also "gauze, muslin," from Persian dulband "turban").