

Finding Food in a Pretty Package

Essential Question:

Which flower produces the sweetest nectar?

At a Glance:

Learners use a refractometer to measure the amount of sugar in nectar and other substances.

Background Information:

Flowers attract pollinators in several ways. Colors and scents attract visitors from a distance, but it is the food that flowers produce that pollinators are really seeking. Some pollinators, such as bees, visit flowers to collect pollen to feed to their young. But many other kinds of animals visit flowers to collect an energy-rich reward, nectar.

Nectar is made of several different kinds of sugars and different plant species produce different amounts and concentrations of nectar in their flowers. Some plants that attract hummingbird pollinators have high concentrations of nectar, in part because hummingbirds have very high energy needs. Plants which attract insects have lower nectar concentrations, but the concentration varies greatly. Plants also differ in flower shape.

Procedure:

1. Late afternoon, Day 1: Locate some plants with flowers that are likely to open the next day. Place a mesh bag (flower cap) over the flower or stem. Close the bag tightly with a twist-tie (but be careful not to damage the flower or stem). Bag several flowers and a couple of species if possible.
2. Day 2: Return to the area with the bagged flowers. If the flowers normally attract visitors in the morning, then you should return in the morning. If the flowers attract pollinators in the afternoon, then you should complete your study at that time.
3. Open the bag. Be careful to keep insects or other flower visitors away from the flowers you had bagged. Take a microcapillary tube and place it into the nectary of the flower. If you are uncertain where the nectary is located, watch pollinators on other flowers to see where they gather the nectar. Leave the tube in the nectary for a few seconds. You should see a clear liquid entering the tube. Wait until the nectar stops entering the tube. Students may wish to measure the column of nectar. *Note: Sometimes it is difficult to get the tube to fill with nectar; you may find that certain flowers are easier to extract nectar from than others.*

Location: Outside, in an area with flowers

Objectives:

Learners will:

- 1) infer that different types of flowers produce different amounts of sugar
- 2) discover that it is possible to measure the amount of sugar in a liquid with an instrument called a refractometer

Skills: observation, data collection, measuring

Supplies:

- mesh bags to cover flowers
- microcapillary tubes
- refractometer
- lens tissue
- distilled water
- soft drinks (coke, fruit juice)
- plastic eyedropper
- ruler

Subjects: science

Time:

Day 1: 15- 45 minutes
(depending upon the number of flowers you bag)

Day 2: 10-45 minutes

4. One student should carefully open the cover on the refractometer. Take the microcapillary tube and carefully blow the nectar onto the glass surface of the refractometer. (BE CAREFUL NOT TO TOUCH OR SCRATCH THE GLASS.)
5. Close the cover.
6. Hold the viewing screen of the refractometer up to the light and look into it. You will see a scale measuring degrees Brix. The degrees equal the percentage concentration of sugar. So if you obtain a measurement of 20 degrees Brix, then the sugar concentration in the nectar is 20%.
7. After you take your reading, wipe the surface clean with a lens tissue. Place a drop of distilled water on the glass and wipe it off. You are now ready to read the next nectar sample.
8. Students will be interested to know how their favorite drinks compare to nectar. Take a plastic dropper and place a drop of the liquid on the glass sample area of the refractometer. Read sugar concentration as done previously.
9. If you want to know the volume of sugar produced, then use the following formula:

$$\frac{\text{Length of tube filled with nectar}}{\text{Length of tube (marked area only)}} \times \text{number of microliters measured by the tube}$$

Discussion/Assessment:

Nectar is an important resource for many animals:

Which animals might use nectar from the different plants as food?

Do you think that animals use only nectar for all their food?

What else might they need?