

CHAPTER 1	Investigation 1.A: Storing Solar Energy in Plants	BLM 1.1.3
HANDOUT		
Question: Do plants need sunlight to make food for themselves through photosynthesis?		

Hypothesis

If plants need sunlight to perform photosynthesis and make starch, then the leaves of plants that are exposed to sunlight should show the presence of starch and the leaves of plants that have been denied sunlight should not.

Prediction

Re-read the introduction to this investigation, as well as the whole procedure. In your notebook, record a prediction about the results you would expect to see if the hypothesis is correct.

Materials

- small test tube
- stopper or stirring rod
- water
- 5 g of cornstarch
- 400 mL beaker of boiling water
- 150 mL beaker with 50 mL of hot ethanol in a hot
- water bath
- Lugol's iodine solution (in a dropper or spray bottle)
- plants with solid green leaves such as geranium (*Pelargonium*) or ivy (*Hedera*)—one plant grown or 4 days exposed to sunlight or under grow lights, and one plant placed in the dark for 4 days
- plants with variegated leaves such as *Coleus*, variegated geranium (*Pelargonium*), or spider plant (*Chlorophytum*)—one plant grown for 4 days exposed to sunlight or under grow lights, and one plant placed in the dark for 4 days
- hot plate
- tweezers (or forceps)
- tongs or oven mitts
- 4 Petri dishes



Safety Precautions

Ethanol ignites easily and iodine stains skin and clothing. Handle all chemicals with great care.

Procedure

1. Confirm the colour change that occurs when iodine solution is applied to starch. Place 10 mL of warm water in a test tube. Add cornstarch to the water until it no longer dissolves. Mix with a stirring rod or stopper and shake the test tube. Now add one drop of iodine solution to the mixture, then mix once again.

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2. You will test for starch in the leaves of four plants. Two of the plants have variegated leaves, and the other two have solid green leaves. (A variegated leaf has streaks or patches of white.) One of the variegated plants and one of the solid green plants were grown in the light for four days. The other two plants, one of each type, were placed in darkness for four days.
3. Take a leaf from each plant. Mark the leaves from plants grown in the light with a notch so you can identify them later. Using tweezers, place each leaf in boiling water for about 10 min. This will soften the cell membranes and remove some of the water soluble pigments (colouring) in the leaf.
4. Use the tweezers to place each leaf in hot ethanol for about 10 min to remove all the pigment colourings.
5. Use the tweezers to place each leaf in a dry Petri dish. Add a few drops of iodine solution to each leaf (or spray the leaves carefully with the solution). Cover the Petri dishes to prevent ethanol and iodine vapours from escaping.
6. When the investigation is finished, clean up your work area and dispose of all materials as directed by your teacher.

Analysis

1. Which of the leaves you tested showed the presence of starch? Explain how you know.
2. Draw an outline of each leaf. Use shading or a different coloured pen or pencil to indicate where starch was detected.

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3. What is the relationship between the pattern in the variegated leaves and the presence of starch?

4. How accurate were your predictions?

5. How valid was the hypothesis?

Conclusions

6. Write a conclusion about the effect of light on the formation of starch in green leaves.

7. What, if any, other factors could have affected the results of this investigation? Explain how you could minimize these factors or their effects.

