

Why Do Leaves Change Color?

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening program*

OVERVIEW: In the fall, your students may wonder why the leaves around them are changing from green to yellow, orange, or red. In this lesson, they learn that leaves don't really "change" color, they actually lose their green coloring, revealing the colors underneath. This experiment enables students to separate the colors in leaves to see what is underneath the green. And while they're waiting for the experiment to work, you can talk about chlorophyll, the green substance that all life depends upon.

GRADES: 2-5

OBJECTIVE: The student will be able to:

- Explain why leaves seem to change color in autumn
- Explain what chlorophyll is and its role in photosynthesis.



BACKGROUND:

Plants are the only living things that can make their own food.

They do this through a process called photosynthesis. In photosynthesis, the plant uses the energy of the sun to change water and a gas called carbon dioxide into a sugar called glucose, which is food for plants. The green chemical chlorophyll captures the sunlight that plants need to make their food. Chlorophyll serves a key purpose in the food chain, not only by making food for plants, but by creating food in plants for animal and humans to eat.

The leaves of plants are actually several colors, but during the long, sunny days of spring and summer, plants produce so much chlorophyll that its green color hides all of the other colors. The plant is busy making food both to grow and to store for the winter. In the fall, plants begin to prepare for the winter when they will become dormant. During this time, the plant is alive but it is not actively growing. As the days become shorter and there is less sunlight, the plant makes less and less chlorophyll until it stops making it all together. With no chlorophyll, the leaves lose their green color, and the other colors underneath are revealed.

MATERIALS:

Green leaves	Bowl for water
Glass jar	Paper towel
Rubbing alcohol	Pencil
Plastic wrap	Tape
Rubber band	

PROCEDURE:

Collect a handful of green leaves. Cut them into small pieces. Put the pieces in the glass jar and pour in rubbing alcohol, just enough to cover the leaves. Cover the top of the jar with plastic wrap and a rubber band

Stand the jar in a bowl of hot water for at least 30 minutes. (Hot water from the tap will work.) Remove the plastic wrap.

Take a 3- or 4-inch piece of paper towel and fold it over in 1-inch strips.

Tape the strip of paper towel onto a pencil so that the end of the pencil sits on the bottom of the jar, and about 1/2-inch of the bottom of the paper towel touches the leaf and alcohol mixture.

Wait and observe for a few hours. The colors in the leaves will separate, leaving different colored stripes on the paper towel.

EVALUATION:

Students write an explanation of the experiment explaining what happened and explaining what they know about photosynthesis and chlorophyll.

Extension: Students research the function of the chemicals that create the other colors in leaves:

yellow = xanthophyll

orange = carotene

red = anthosyanin.

New Jersey Learning Standards

Science: 2: LS2.A 3:LS1.B 4:LS1.A 5:PS3.D, LS1.C

English Language Arts: 2:W.2.2,4,8 3:W.3.2.A-D, W.3.4,8
4:W.4.2.A-E, W.4.4,8 5: W.5.2.A-E; W.5.4,8