



LESSON SUMMARY

Students will gain an understanding of why leaves change colour and what happens to them after they fall.

Activity Information

Grade Level Primary

Estimated Duration: 45 minutes for each experiment

Materials: **For True Colours** green leaves, mortar and pestles or shallow dishes and spoons, rubbing alcohol, small glass jars or beakers, coffee filter paper, pencils or small dowels, tape, scissors, ruler

For Leaf Litter “Gitter” plastic bags, trowels, hand lenses or microscopes, paper towels

Setting: Outdoors and indoors

Key Vocabulary: Chlorophyll, pigment, forest litter, decay, recycle, bacteria, fungus, humus, decompose

Teacher Background

Each autumn, cooler temperatures and shorter days trigger a change in the cells at the base of deciduous trees. These cells die and form a barrier to the transportation of moisture to and from the leaf. Chlorophyll in the leaves starts to break down, allowing other leaf pigments to emerge and become more prominent. These pigments produce the brilliant red, yellow and orange colours that we see in autumn.

After the leaves fall to the ground, the nutrients in the leaves are returned to the soil through the decomposition of plant matter. The mix of plant matter consists of leaves, old seed pieces and branches and is called "leaf litter". This decomposing is accomplished by a large group of organisms known as decomposers. They include bacteria, fungi, earthworms and insects. In some places the decomposition rate is so rapid that dead materials shed in one year have been entirely reduced to their component parts by the next year. In other places the rate is much slower and a considerable depth of litter can accumulate. However, in a forest all dead material is eventually recycled.

ACTIVITY

For True Colours

1. Discuss with students what they think causes leaves to change colour in the fall.
2. Break the class into small testing groups and give each group several green leaves from the same tree and a mortar and pestle or dish and spoon. Have students tear the leaves into small pieces and then crush them into a pulp.
3. Place the pieces into the jar or beaker and add just enough rubbing alcohol to cover them. Let the mixture stand for 5 minutes
4. While the mixture is standing - cut a strip of coffee filter paper 2.5 cm wide and about 10 cm long. (It must be long enough to hang in the jar from the pencil and touch the alcohol).
5. Suspend the coffee filter from the pencil or dowel with tape so it won't fall into the jar. Place the filter in the jar so it just touches the alcohol. If it is too long remove immediately and cut off the excess from the bottom.
6. When the liquid line is halfway up the filter paper remove and rest it on the paper towel to dry. Observe the bands of colour that form there. (Green for chlorophyll, as well as red yellow and other pigments.)
7. Explain that the yellow or red pigment is always present in the leaves. The green chlorophyll usually hides them. In the fall of the year chlorophyll disappears and the other pigments can be seen.

For leaf litter “gitter”

8. Discuss with the students what a tree would get rid of, besides leaves, every year.
[dead pieces of bark or branches, seeds and seed husks]
9. Either visit a wood lot or bring into the classroom a bucket of leaf litter to observe the leaves, twigs and bits lying on the forest floor.
10. Have the students carefully work their way down through the litter to the soil layer and record observations of the changes that take place on the way down.
[the pieces decay and start to lose their distinctive appearance]
[the layer of leaf litter that is closest to matching the soil is called humus.]
11. Have them feel the litter to get a sense of the moisture content at the surface and at the soil level. Look for any creatures that are assisting in the soil creation process.
12. In the forest or class setting make a list of all the materials found in the leaf litter.
13. Discuss the concept of a cycle in the forest. Begin by using the annual fall off the deciduous leaves as an example.

What happens to these leaves on the forest floor? Introduce or recall the term humus.

What causes the decay of the forest litter into humus? [decomposition]

Why is humus important to the forest?
14. Put your samples back so they can continue to do their job for the forest. Ask who uses leaves to create new soil around their homes for gardens and trees to protect them over the winter.

Extensions

15. Try the leaf colour experiment with leaves that have already changed colour.

How do you explain any difference in your observation?
16. Try the leaf colour experiment with each group doing a different species of tree and see what colour you get - keep your results until the leaves start to change to see how close they get to the actual results.
17. For the leaf litter “gitters”, collect a big pile of leaf litter in a pail and over several days check the core temperature. If the temperature rises, then the rate of decomposition is rapid through the process of composting.

Check the core temperature of a home compost pile. What are the differences in rate and material in each pile? [In a forest the rate is usually slower]