Deciduous Trees

Life Science | Lesson Guide

2nd Grade

Photo Description

Trees around a lake have changed colors from green to yellow, orange, and red. The leaves are falling off the trees because it is autumn. A wooden walkway goes out over the water where you can see the colorful trees.

Scientific Phenomena

The Anchoring Phenomenon is seasonal leaf color change and leaf drop in deciduous trees. This happens because as daylight hours shorten and temperatures cool in autumn, trees stop producing chlorophyll (the green pigment that captures sunlight for food-making). Without green chlorophyll masking them, other pigments like carotenoids (yellows and oranges) and anthocyanins (reds and purples) become visible. Eventually, trees form a special layer of cells that cuts off the leaf from the branch, causing it to fall off. This helps trees conserve energy and water during winter when conditions are harsh for making food through photosynthesis.

Core Science Concepts

1. Seasonal Changes: Plants respond to changes in temperature, daylight, and weather patterns throughout the year.

2. Plant Adaptations: Deciduous trees have adapted to survive winter by dropping their leaves, which reduces water loss and energy needs.

3. Photosynthesis and Pigments: Leaves contain different colored chemicals (pigments) that help plants make food from sunlight, but we usually only see the green ones during growing season.

4. Life Cycles: Trees go through predictable cycles each year - growing leaves in spring, staying green in summer, changing colors in fall, and going dormant in winter.

Pedagogical Tip:

Use a simple color wheel or paint mixing activity to help students understand that yellow and red pigments were "hidden" under the green all along, rather than the tree "making" new colors in fall.

UDL Suggestions:

Provide multiple ways for students to observe seasonal changes: real leaf collections, time-lapse videos, photo sequences, and tactile leaf rubbing activities to accommodate different learning preferences and abilities.

Zoom In / Zoom Out

1. Zoom In: Inside each leaf, tiny structures called chloroplasts contain the green chlorophyll. When the tree stops sending water and nutrients to the leaf, these chloroplasts break down, revealing the yellow and orange pigments that were always there.

2. Zoom Out: This forest is part of a larger ecosystem where falling leaves become food and shelter for insects, worms, and other small animals. The decomposing leaves also add nutrients back to the soil, helping new plants grow next spring.

Discussion Questions

1. What patterns do you notice about when and how trees change colors each year? (Bloom's: Analyze | DOK: 2)

2. How might animals that live in this forest prepare differently for winter compared to the trees? (Bloom's: Compare | DOK: 2)

3. What do you think would happen if a tree kept all its leaves during a snowy winter? (Bloom's: Predict | DOK: 3)

4. Why do you think some trees in the photo are still green while others have changed colors? (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

1. Misconception: Trees make new colors in their leaves during fall.
   Reality: The yellow and orange colors were always in the leaves but were hidden by the green chlorophyll.

2. Misconception: All trees lose their leaves in winter.
   Reality: Only deciduous trees lose their leaves. Evergreen trees (like pine and fir) keep their needle-like leaves all year.

3. Misconception: Trees are dead or dying when leaves fall off.
   Reality: Healthy deciduous trees naturally drop their leaves as a survival strategy for winter.

Cross-Curricular Ideas

1. ELA - Descriptive Writing & Poetry: Have students write or dictate sentences describing what they see in the photo using color and texture words (red, orange, smooth, bumpy). Create a simple fall acrostic poem using the word "AUTUMN" or "LEAVES" to practice phonics and vocabulary together.

2. Math - Sorting & Graphing: Collect real leaves from outside and sort them by color (red, yellow, orange, brown, green). Create a simple picture graph showing how many leaves are in each color group. Count and compare which color has the most and least leaves.

3. Art - Mixed Media Leaf Collage: Students arrange real fallen leaves or colored paper leaf cutouts to create a forest scene similar to the photo. This connects to understanding how artists use color and composition to show seasonal changes, and reinforces the concept of pigments and colors.

4. Social Studies - Community Helpers: Discuss how park rangers, groundskeepers, and city workers help maintain natural spaces like the one in the photo during fall. Students can draw or dictate what jobs help keep parks safe and beautiful during different seasons.

STEM Career Connection

1. Botanist (Plant Scientist): A botanist is a scientist who studies plants—how they grow, why they change colors, and how they survive different seasons. Botanists might work in forests, gardens, or laboratories to learn about trees and flowers. They help us understand nature better!

- Average Annual Salary: $65,000 USD

2. Park Ranger or Naturalist: Park rangers are people who take care of forests, lakes, and parks like the one in the photo. They watch for sick or dead trees, help visitors learn about nature, and protect the animals and plants living there throughout all four seasons.
- Average Annual Salary: $42,000 USD

3. Environmental Scientist: These scientists study how weather, seasons, and climate changes affect forests and bodies of water. They might measure water temperature, count different types of trees, or predict how seasons might change in the future to help protect nature.
- Average Annual Salary: $73,000 USD

NGSS Connections

- Performance Expectation: 2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitats.
- Disciplinary Core Ideas: 2-LS4.A - There are many different kinds of living things in any area, and they exist in different places on land and in water.
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence.

Science Vocabulary

* Deciduous: Trees that lose their leaves every fall and grow new ones in spring.
* Chlorophyll: The green stuff in leaves that helps plants make food from sunlight.
* Pigment: Natural colors found in plants and animals, like the red in apples or yellow in bananas.
* Photosynthesis: The way plants use sunlight, water, and air to make their own food.
* Adaptation: Special features that help living things survive in their environment.
* Dormant: When a plant rests during winter and stops growing until spring.

External Resources

Children's Books:
- Why Do Leaves Change Color? by Betsy Maestro
- Red Leaf, Yellow Leaf by Lois Ehlert
- Fletcher and the Falling Leaves by Julia Rawlinson