Woodland Scavenger Hunt: Studying Plant Adaptations

Activity Overview
Students search for certain types of plant adaptations.

Objectives
Students will:

- Understand how a plant's structure can reflect adaptations to its environment
- Be introduced to the structure and function of leaves and roots
- Observe and begin to recognize several woodland plants

Subjects Covered
Science and Art

Grades
K through 8

Activity Time
30 minutes minimum

Season
Late spring, Summer, Early fall

Materials
Small bags (one for each 2-3 students) each including a bright red bead, a green fan, length of knotted twine, and a piece of brown paper bag. Also in each bag have several strands of red yarn or ribbon to toe on plants..

State Standards
Science: F.4.1, F.4.2, F.4.4, F.8.2, F.8.1, F.8.9, F.12.9

Source
Kathy Miner

Background
Sunlight is often the limiting in the woodland environment. In the summer, the broad leaves of the tree canopy can cast shade and make light levels quite low on the forest floor. Winds are not strong or constant in the woods as out in an open environment. Additionally, the frozen water of the winter months is unavailable to plants. As a result of these conditions, woodland plants have many traits that are believed to be adapted to these low light, intermittent wind, and/or winter drought conditions. "An adaptation is any anatomical, physiological or behavioral characteristic conferring survival value (termed fitness) that contributes to eventual reproductive success." (From Peterson Field Guides: Ecology of Eastern Forests, page 252)

Leaf size tends to increase along gradients of increasing rainfall, humidity and/or soil fertility, and to decrease with increasing sunlight. So, in forests where sunlight levels can be rather low in the summer we may expect to see herbaceous and woody plants with large leaves, finding larger leaves in shadier areas. This allows them to absorb as much sunlight reaching through the forest canopy as possible.

Low light on the forest floor drives many species to grow up towards the canopy. Small, young trees sprout up quickly where gaps appear in the canopy. Vines make use of the stability of trees by climbing up trunks to the forest canopy and the sunlight.

The frequency of appearance of different seed dispersal mechanisms changes from one plant community to another. In open communities, wind dispersed seeds are common. The wind is almost ever-present to disperse those seeds. In the forests, wind is minimal. So plants with wind-dispersed seeds are less common than plants with animal-dispersed seeds in the understory of the forest. One way for seeds to be dispersed is to attract fruit-eating birds and mammals with showy red berries. Winterberries, viburnums, Jack-in-the-pulpits, and bittersweet are just a few examples of woodland plants with showy fruits. Of course, there are bright berries in other communities, and some forest plants (e.g. maples and ash) with wind-dispersed seeds, but overall, wind-dispersal is more common in prairies and meadows and animal dispersal is common in woods.

When winter rolls around the ground can freeze to a depth of several feet, and water that does fall from the sky is frozen. This creates a months-long drought. Trees in woodlands are adapted to this drought in part because they drop their leaves each autumn, thus minimizing water loss.

The items in the scavenger hunt reflect low light, intermittent wind, and/or low winter water adaptations.
Red bead represents the bright fruits that attract birds, chipmunks or other animal seed dispersers.
Paper fan represents the big leaves that can fan out to absorb as much light as possible.
Piece of brown paper bag represents the fallen leaves that drop in autumn.
Piece of string with knots represents vines that twist or tendril around tree trunks on the way to the canopy.

Woodland plants have developed adaptations in response to conditions of low light, non-constant wind, and winter droughts. They face competition for nutrients, water, pollinator attention, and also pressure from herbivores and disease organisms. These are points to discuss with students.

Note: If you have poison ivy or deadly nightshade in the site for this activity, be sure students recognize it before starting.

Activity Description

Divide into teams of 3-4, give each team a bag. How many different plants can they find with adaptations represented by the objects in the bag? Trace a leaf, sketch the plant or tie a piece of yarn around it to show others. Be careful not to harm the plant. Regroup and compare findings.

Extensions

- Find examples of adaptations to other factors such as need to disperse seeds, competition for space or pollinators.
- Create a "perfectly adapted" woodland plant. Build a model of the plant and present it to others. After discussion and examining other students' work, revise your own plant.
- For each adaptive trait observed, hypothesize a different condition that could have caused the same trait.
- Describe animal adaptations that could have arisen in response to the woodland conditions.

Additional Resources

- Caduto, M.J., Bruchac, J. (1994). Keepers of life. Golden, Colorado. Fulcrum Publishing.
- Kricher, J.C., Morrison, G. (1988). Peterson field guide: Ecology of Eastern forests. New York, NY. Houghton Mifflin Company.

Assessments

- Describe 3 examples of how plant structures are modified by low water availability and high temperatures.
- How do prairie plants survive drought, high temperatures, and intense sunlight?
- Given the specific adaptations woodland plants have developed in response to low light availability, what kinds of adaptations would you predict plants might develop in response to