

A Forest Grows

Blowing in the wind, stuck to fur, or pre-packaged with fertilizer, today's seeds are tomorrow's forests. Through this activity, students discover some of the forest's reproductive strategies.

Background

Forests add to the diversity of plant and animal species. They shade streams, keeping shallow waters cool and free of certain types of prolific algae. They allow rain water to percolate into the soil, recharging aquifers and keeping streams and rivers flowing at relatively consistent rates. Forests provide inviting places for people to hike, camp, picnic, and hunt, and they provide the raw materials for a vast array of products from lumber and turpentine to paper and flowerbed mulch.

Forests go through a process of succession, where certain species become established in an area only after other species have grown there first. Pines grow best in open sunlight and are often the first trees to grow in an area. Eventually, pines are replaced by other species such as sweet gums, maples and tulip poplars. These in turn are replaced by oaks, hickories and beeches. When a forest reaches the stage where the tree species change very little over time (about 150 years), it is called a climax forest.

Because a seedling often has a better chance of surviving if it can grow away from its parent tree, many tree species have evolved ways to disperse their seeds. Pine, tulip poplar, ash and maple seeds have "wings" that permit them to be carried by the wind as they flutter to the ground. Sycamore seeds have "parachutes" and can ride the wind for miles. Beeches, oaks, hicko-

ries and walnuts produce nuts that are relished by squirrels. The squirrels eat many of these nuts, but they also plant some by burying them for winter storage. Tupelo, dogwood, persimmon, cherry and holly produce fruits which are consumed by raccoons, opossums and song birds. The seeds, adapted to endure the rigors of digestive systems, are eventually dropped, complete with a little dose of fertilizer.

Procedure

Before the Trip:

1. Discuss with the class the basic concepts of forest succession and how it is to the advantage of many tree species to disperse their seeds.
2. Ask students to give their ideas about how tree seeds might travel and write these ideas on the board.
3. Then, ask students to classify these methods into groups and subgroups similar to the listings on the illustrated seed dispersal chart; write the classified list on the board.
4. Have students name or describe trees (or other plants) that they know use the methods listed on the board. Write these beside the methods.
5. From this list, make a chart similar to the one illustrated. Give each type of seed dispersal described by the class a block on the chart. Group similar methods together. Do not include the names of trees listed by the class.
6. Divide the class into teams of two to four students each.
7. Make at least two copies of the seed dispersal chart for each team.

Grade Levels: 3–10

Objectives

Students will *investigate* variation in seed structure and methods of dispersal by:

- *observing* seeds' physical appearances and evidence of trees' reproductive strategies; and,
- *inferring* possible relationships among types of seeds, seed dispersal methods, and location of seedlings.

Materials

- large envelope
- bag or box for holding collections

Per team:

- notebook or plain paper
- clipboard
- pencils or pens
- clear adhesive tape
- flagging tape or bright ribbons
- 5-10 plain sheets of paper

When

Any daylight hours. Late summer to early fall is best, since seeds and fruits are most abundant then.

Where

All parks.

Time Required

At the Site: 45 minutes to 1 hour, plus walking time to and from study location.

Resources

Fox, B. 1995. *Tree Trekking*. Virginia Cooperative Extension Service, 4-H. Box 9081. Virginia State University. Petersburg, VA 23806.

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At the Site:

1. Lead the class to a forested area of the park or natural area preserve.
2. Make sure everyone can recognize poison ivy, which can cause a terrible rash. It may appear as a woody vine or look more like a low shrub. The leaves are usually smooth and shiny above, and are divided into three distinct leaflets. The fruits, which usually grow in clusters, are round, slightly fuzzy, about 5 mm wide and white when ripe. For an illustration, see the previous activity, “Changing of the Green.”
3. Give each team two copies of the seed dispersal chart and a roll of clear tape.
4. Instruct the teams to collect one sample of each type of seed or fruit they can find and to tape each onto the chart in the block for the dispersal method that they think applies to the seed.
5. Set boundaries for the search for seeds and fruits.
6. Allow teams to spread out and collect seeds and fruits for about 15 minutes.
7. Reassemble the students and place their charts together on the ground where everyone can see them.
8. Discuss:
 - Which seed(s) seems to be most common?
 - Which dispersal method seems to be most common?
 - Were any of the seeds or fruits taken directly off the parent tree?
 - Could anyone tell if a fruit or seed was laying on the ground directly under the parent tree or if any seeds were obviously not under the parent tree?
9. Explain that the next part of the activity will help them better discover how far seeds might have traveled from the parent tree.
10. Give each group some flagging tape or bright ribbon, plain sheets of paper and tape. Instruct them to:
 - Find a tree seedling (or sapling) two to four feet tall.
 - Mark the seedling with a flag.
 - Pick one (and only one) leaf from the seedling and tape it to a piece of paper.
 - Search the forest for a big tree with leaves that look like the one from the seedling. Consider this to be the parent tree, though in reality it may not be. (Since it may be hard to see the leaves on very tall trees, suggest that they look for fallen leaves under tall trees as well.)
 - If a leaf can be reached on the parent tree, pick one leaf and tape it next to the seedling leaf.
 - As one team member stand by the parent tree, another returns to the seedling and stands by it. A third team member walks directly from the parent to the seedling, counting the number of steps between them, and records this number on the paper under the leaves.
 - Repeat this process with as many different types of seedlings and parent trees as possible in the allotted time.
 - If no obvious parent tree can be found for a particular seedling, students should note this on their paper.
11. Allow 15 to 20 minutes to conduct the activity. Reassemble the class and place the collections on the ground where everyone can see them. Discuss:
 - Which seedling was closest to the parent tree?
 - Which seedling was farthest from the parent tree?
 - Were there any seedlings for which a parent tree could not be found?
 - How do you think each seedling was planted?

Project Learning Tree. Virginia Department of Forestry. 900 Natural Resources Drive, Charlottesville, VA 22903.

Websites to visit:

Plant Adaptations For Pollination And Seed Dispersal

http://www.exploringnature.org/graphics/seed_dispersal_activity.pdf

Exploring Seed Dispersal Mechanisms

<http://teacherlink.org/content/science/instructional/activities/seeds/seeds-print.pdf>

National Arbor Day Foundation

www.arborday.org

- Was there any evidence that any of the seedlings came from seeds like those found in the first part of the activity?
- What seems to be the most common seedling?
- What seems to be the most common tree in this forest?
- Are the most common tree and seedling the same species?
- Based on the above question, will the forest look very different when the seedlings are full grown?

Follow-up:

1. Tape or tack the papers with the leaf samples on a wall in rows. Group those with similarly-shaped leaves together in columns.
2. Give each leaf type an identifying letter or number.
3. Each student should study the leaf display and make a bar chart showing the distance, in footsteps, of each type of seedling from its parent tree. (Students should calculate and use averages for those species represented by more than one seedling.)
4. Students can use field guides to identify the seeds and leaves they collected and, where appropriate, to match the seeds to the leaves.

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Seed Dispersal Chart

Seeds Carried by Animals

Eaten and left in droppings

Buried for "storage"

Other

Eaten and left in droppings	Buried for "storage"	Other

Seeds Carried by Wind

"Parachutes"

"Wings"

Other

"Parachutes"	"Wings"	Other

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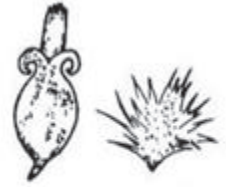
Hickory



Persimmon



Beech



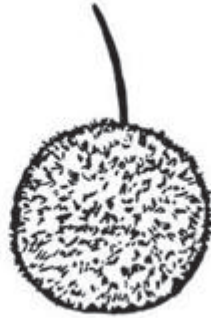
Black willow



Hop hornbeam



Sweetgum



Sycamore



Dogwood



Pine



Water tupelo



Live oak



Ironwood



Red maple



Pawpaw



Tulip poplar

Standards of Learning: 3.8, 3.10, 4.1, 4.4, 4.5, 4.9, 5.1, 5.5, 6.1, 6.9, LS.1, LS.4, LS.5, LS.8, LS.11, LS.12