



Comparing Trees

LESSON

GRADE LEVEL K-4; 4-12

CATEGORY Plants, Animals and Habitats

TOPIC Tree leaf types and adaptations to environment

LENGTH

1 -2 class periods

MATERIALS

Comparing Trees Worksheet (copy page), Tree ID Sheet (copy page), pencils, pens, soft lead pencils or chalk for rubbings. Various Tree Identification books, or Cards

SETTING

Outdoors and indoors

GROUP SIZE

Any size

SKILLS

Analysis, applying, classifying, comparing, concluding, interpreting, synthesizing

SUBJECT AREAS

Science, Biology

KEYWORDS

Evergreen, Deciduous, Broad-leaf, Conifer, Needle-leaf, Scale-leaf

Overview

Students use observation to notice and record differences between trees using leaves in the forest environments in which they grow. K-4: will recognize differences and similarities of trees and classify them into needle and broad leaves tree types. Grade 4-12: use leaf classification and observation notes in a forest environment to try to identify trees to the level of family or species.

Objectives

Students will be able to:

- understand the differences between broad and needle-leaved trees; and
- learn how to identify trees.

Background

The forest is made up of many parts. The first thing we often notice is the trees, no matter what kind of forest we are in. Trees may be classified into two broad categories: evergreen and deciduous. The name “evergreen” is used to mean trees which retain their leaves and stay green all year round. The leaves are not actually fixed on the tree permanently but, unlike deciduous trees which lose all their leaves once the growing season is over; evergreens only shed old leaves a few at a time. Most evergreen trees are needle-leaved in shape and most deciduous are broad-leaved in shape.

Like all living things, trees are adapted to survive in the environments in which they occur. Some trees have downward sloping branches and which tend to shed snow and thus prevent breakage when snowfalls are heavy. This is one reason why conifers are better suited or adapted than broad-leaved trees to survive in a place with heavy snowfall. Deciduous trees need large supplies of minerals every year in order to form their new leaves. However the deciduous tree's broad leaves are also well adapted to capture large amounts of sunlight used to manufacture food (sugars) to store for the next year. This is why you often find broad-leaved trees in recently cleared areas (from fire or flood) as these areas tend to be nutrient rich soils with lots of sunlight. An evergreen needle-leaves that were grown in past years capture most of the light energy the tree needs to survive. Since evergreens shed only a few leaves each year and grow slowly, they need only enough minerals each year to grow a few new leaves. This is why you often find more evergreen trees than deciduous trees growing in areas with nutrient-poor soil.

Most of the evergreen trees that occur in B.C. have needle-like leaves. Some examples of evergreen trees are: white spruce, black spruce, lodgepole pine, western hemlock and subalpine fir. These trees are also known as coniferous trees or conifers, because their seeds are produced on the scales of cones. The forest industry sometimes refers to conifers as softwoods because the wood is generally soft and resinous.

Most of the deciduous trees in B.C., with the exception of larches, have broad leaves that are shed each autumn. Broad-leaved trees play a very important role in the forest. Their relatively short lives increase the rate of nutrient cycling as they fall to the forest floor and become part of the soil once again. They are often pioneer species after disturbance, hence their common occurrence in riparian areas. They also provide food, cover and nesting sites for a very diverse range of forest dwellers. Some of the most common broad-leaved trees in BC are trembling aspen, black cottonwood, paper birch, bigleaf maple, red alder and balsam poplar. Besides having broad leaves instead of needles, most of B.C.'s deciduous trees (again, except for the larches) produce their seeds in fruits instead of in cones. As well, the wood of broad-leaved trees is generally harder than wood of evergreens, hence the term "hardwood."

The following definitions help to illustrate that even at this coarse level of classification, it is not easy to say all trees are just one type or another.

Deciduous: Plants whose leaves are not persistent and fall off at the end of a defined growing season or during a period of temperature or moisture stress such as frost. Typically refers to leaves on broad-leaved trees, but some conifers are deciduous (e.g. larch).

Broad-leaved: Refers to the shape of leaves on angiosperm plants, most of which are characterized by a broad, flat surface with a network of veins throughout. Most broad-leaved trees are deciduous and timber from broad-leaved species is typically called hardwood.

Needle-leaved: Refers to coniferous trees, where there are many small, needle-like leaves covering the entire tree.

Scale-like leaves: A scale-like structure that performs the same function as a needle or leaf. Often much smaller than leaves or needles (In B.C., found on western redcedars, yellowcedars and junipers).

Evergreen: Trees with green leaves or needles that are retained throughout the season with no marked period of total leaf shedding. As a result, the tree is capable of year-round photosynthesis and may have a competitive advantage over

other species — an evolutionary factor that partly explains the great success of conifers around the world. Some evergreens have adapted leaf forms to assist in water conservation (e.g. conifers have needles, while broad-leaf evergreens such as arbutus, laurel and holly, have very waxy leaves).

Conifer: A wide range of tree species within the order Gymnospermae (plants that bear naked seeds, usually within cones.) Conifers are typically evergreen in B.C. (except for larches) bearing cones, and having needle-shaped or scale-like leaves.

The Exceptions to the Rule:

Arbutus is an evergreen tree that does not have needle-like leaves. It also doesn't bear cones—it produces its seeds in berries. This makes arbutus an evergreen broad-leaved tree, the only one in Canada.

BC larches are cone-bearing trees that are not evergreen. Their needle-like leaves turn yellow and shed each autumn. This makes the larches deciduous coniferous trees.

Procedure

1. Prior to the field visit, older students should read and review the background information and sidebar information taking note of how to describe leaves so identification is easier.
2. Select a site with a variety of trees with both broad-leaves and needles or scales. For older grades a site with a minimum of introduced species or garden hybrids will help reduce confusion when attempting identification. However, examples in the Families and Genera chart include introduced trees. Identification for younger students is important but the similarities and differences is more important than ID-ing the tree.
3. Ask participants to choose two trees, one with broad-leaves and another with needles (or scales).
4. Complete the Comparing Trees activity sheet. Younger grades can look at the differences between different broad and needle-like tree leaves and take leaf and trunk bark rubbings while introducing increasing complexity as knowledge and ability increases. For older grades use the ID notes section to write notes about 'why' they think tree exists where it is (is there a creek near by? What about nutrients—is the soil rocky or is there lots of leaf litter? And is the area prone to heavy snow fall?) based on the background information reading.



5. To help facilitate the activity, you can arrange a signal for participants to move on to the next step or tree.
6. Based on their findings, ask participants to compare and contrast the differences between the trees they have chosen.

Evaluation

1. Identify a broad-leaved and needle-leaved tree from a real or illustrated example.
2. Define broad-leaved and needle-leaved giving an example of each.

Extensions

1. Ask participants to exchange activity sheets to see if they can identify the other person's trees (ensure they have been studying trees in different sites).
2. Have the students make a reference collection of dried, pressed leaves and branches, cones and fruit.

Additional Resources

Tree Book: order a copy from HCTF Education :
hctfeducation.ca/product-category/books-and-guides/

Tree Book online:
www.for.gov.bc.ca/hfd/library/documents/treebook

Tree Book app: abcfptrees.com/app

References

1996 Northwest Territories Department of Renewable Resources.

Adapted with permission from NWT's Focus on Forests, Evergreen and Deciduous Trees."

Dunster, J. and K. Dunster. 1996. The Dictionary of Resource Management.

