

## Lesson – Hardwoods vs Softwoods

This lesson covers the two major differences between “Hardwoods” and “Softwoods.”

Trees are divided into two broad classes, usually referred to as hardwoods and softwoods. These names can be confusing because some softwoods are harder than some hardwoods. Conversely some hardwoods are softer than some softwoods. For example, softwoods such as Loblolly Pine and Douglas Fir are typically harder than the hardwoods Basswood and Aspen.

Hardwoods are angiosperms; trees that reproduce by flowers and have broad leaves. Their seeds are enclosed in the ovary of the flower. These trees are usually found in broad-leaved temperate and tropical forests. In temperate and boreal latitudes, they are mostly deciduous; meaning they lose their leaves every autumn as temperatures fall and are dormant in the winter. In the tropics and subtropics, hardwoods are mostly evergreens.

Softwood is wood from gymnosperm trees such as pines and spruces. The term "gymnosperm" comes from a composite Greek word literally meaning "naked seeds". Gymnosperm seeds develop either on the surface of scales or leaves, which are often modified to form cones (like pinecones), or solitary seeds (commonly called nuts) as in yew, Torreya, or Ginkgo. By far the largest group of living gymnosperms are conifers which include pines and cypresses.

Wood is a hygroscopic material. Hygroscopic is the phenomenon of attracting and holding water molecules via either absorption or adsorption from the surrounding environment at normal or room temperature. The structure of wood is designed to transport water from the roots throughout the tree. The cellular structures of trees for transporting water differ between hardwoods and softwoods, which creates the second defined difference.

Hardwoods have a more complex structure than softwoods and are often much slower growing as a result. Hardwoods are porous; they contain vessel elements which are wood cells with open ends, as shown in this microscopic image of a typical hardwood structure. When vessel elements are set one above another, they form a continuous tube (vessel), which serves as a conduit for transporting water or sap in the tree. The vessels may show considerable variation in size, shape of perforation plates, and structure of the cell wall, such as spiral thickenings.

Softwoods are nonporous as they do not contain vessels. Water transport throughout the wood is achieved by elongated cells called tracheids, which run lengthwise with the trunk in a more even pattern. Because tracheids have a much higher surface to volume ratio compared to vessel elements, they serve to hold water against gravity (by adhesion) when transpiration is not occurring. This creates differences in the grain structures of softwoods compared to hardwoods.

Thank You