



PID
FLOORS

The Life of a Tree

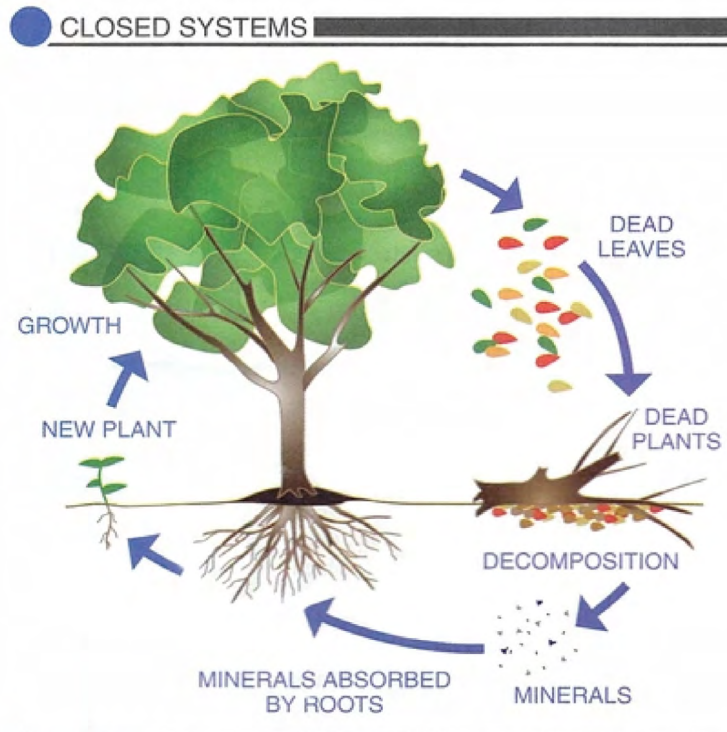


Figure 3-10. A closed system is a cyclical system in which materials and resources are consumed and then reused or recycled.

WHAT IS A TREE?

A tree is a living plant which helps to regulate important cycles that allow life to exist on Earth. Take a minute to think about this fact of life. Since the beginning of time, trees have helped keep oxygen in our atmosphere, which has allowed the evolution of life. As the third planet from the sun, Earth is in perfect distance from the sun to benefit from its rays to feed our plants that which keep our home planet's major Earth system cycles in balance that allow us to exist.

HOW TREES MEET BASIC HUMAN NEEDS

Trees produce oxygen for humans and animals to breath. Trees remove carbon dioxide from the air through the carbon cycle, which contributes to healthier outdoor air conditions. They contribute to the water cycle on Earth, making wood (and wood products) hygroscopic; they absorb and release water. Trees are the main contributors to replenishing the atmosphere with moisture, which drives the water cycle on Earth. Trees help to regulate temperatures around the planet,

and serve as homes to many animals, as well as, insects. Trees provide humans and animals with necessities such as vitamin rich fruits, nuts, and even leaves.

Humans can use nature to improve their lives, specifically a walk through a forest or park, for relaxation and to nourish the soul with inner peace/clarity. Studies have shown that being in nature can help lower blood pressure, heart rate, and aggression. Other studies have proven that wood surfaces in a room can help lower sympathetic nervous system activation. This connection we feel to be near nature and living parts of nature is called biophilia.

Aside from all that, humans have been using trees as a raw material for all kinds of things: paper, house building materials, furniture, writing utensils, and in our case flooring. There are many kinds of trees, with many different uses. PID Floors will always provide our clients with the most honest, knowledgeable information on all available wood flooring options. Trees are anisotropic, meaning they have different properties in different directions. The anisotropic feature highlights the tensile strength and load bearing strength of wood building materials.

LIFE OF A TREE

But what exactly is a tree?

For the sake of simplicity let's observe an oak tree's life. An oak tree can live several hundred years, up to 600 years. Oak trees reach maturity at 40 years. There are 600 different species of oak (*Quercus*). As author Peter Wohlleben explains, when a tree starts in a forest, it equates to winning the lottery for that acorn. A mature oak tree drops about 10,000 acorns in a mast year (about every 3 years), which equates to a little less than a million acorns in an average oak tree's lifetime. Statistically, every tree produces at least 1 tree to replace it when it dies. All the other seeds are eaten by animals or returned to the soil through decomposition.

When an acorn germinates, it is still a guess whether that acorn will survive. Young seedlings require sunlight, nutrients, water, protection from hungry animals, pests and fluctuating seasonal weather. Young seedlings cannot survive in the shadows of its mature companions' canopy. Harvesting mature trees from a well-managed forest creates openings in the canopy which allow young trees an opportunity to mature themselves. This also occurs when a mature tree falls due to naturally old age, an infestation by a pest, or a weather episode.

ENVIRONMENTAL CONTRIBUTIONS

The illustration below shows the basic components to a mature tree. As part of the water cycle, the tree roots absorb water from the ground, and is dispersed throughout the tree via its inner bark xylem by a process called osmosis. This process also feeds dissolved nutrients from the soil to the tree. As the water travels up to the leaves, excess water evapotranspires back into the atmosphere. Evaporation and transpiration from trees and plants is the main method by which the atmosphere has moisture replenished. For example, in areas with no trees, there usually exist very arid land conditions downwind. Trees have a big role in the global carbon cycle by sinking carbon from the atmosphere to use during photosynthesis, and producing oxygen as a by-product.

As mentioned in the previous section, proper harvesting of trees in a well-managed forest is beneficial to the future regeneration of the forest. By harvesting trees, forest managers allow opportunities for younger saplings at a chance to survive through less competition for resources by allowing them space and resources to grow. According to the Department of Environmental Conservation, younger and faster growing trees do sequester (absorb) more carbon from the atmosphere annually. By properly harvesting trees from forests, forest managers are providing a naturally renewable, raw material good for human consumption, which in turn helps sequester more carbon from the atmosphere.

Wood, by nature, has low environmental impacts. The reason behind this is that since trees sink carbon from the atmosphere, and every part of a tree is used in the manufacturing process of wood products, wood products are essentially carbon neutral. This is shown in a Life Cycle Inventory conducted by researchers from the Forest Products Laboratory, which is a national laboratory within the U.S. Forest Service, on the Global Warming Potential (GWP also known as atmospheric carbon emissions that drive global climate change) of prefinished solid and engineered wood flooring in the Eastern U.S.

Another study conducted by Dovetail Partners, a non-profit organization which aims to help firms become third party certified of strict sustainable standards and provide environmental information, concluded that wood flooring has the lowest environmental impacts compared to other floor coverings. Floor coverings that were covered in this life cycle assessment were wood, cork, linoleum, terrazzo, stone, vinyl, ceramic tile, nylon carpet, and wool carpet. Although, natural stone is said to have zero emissions and ease of maintenance, they also contribute a significant amount of environmental harm and energy use during the production process.

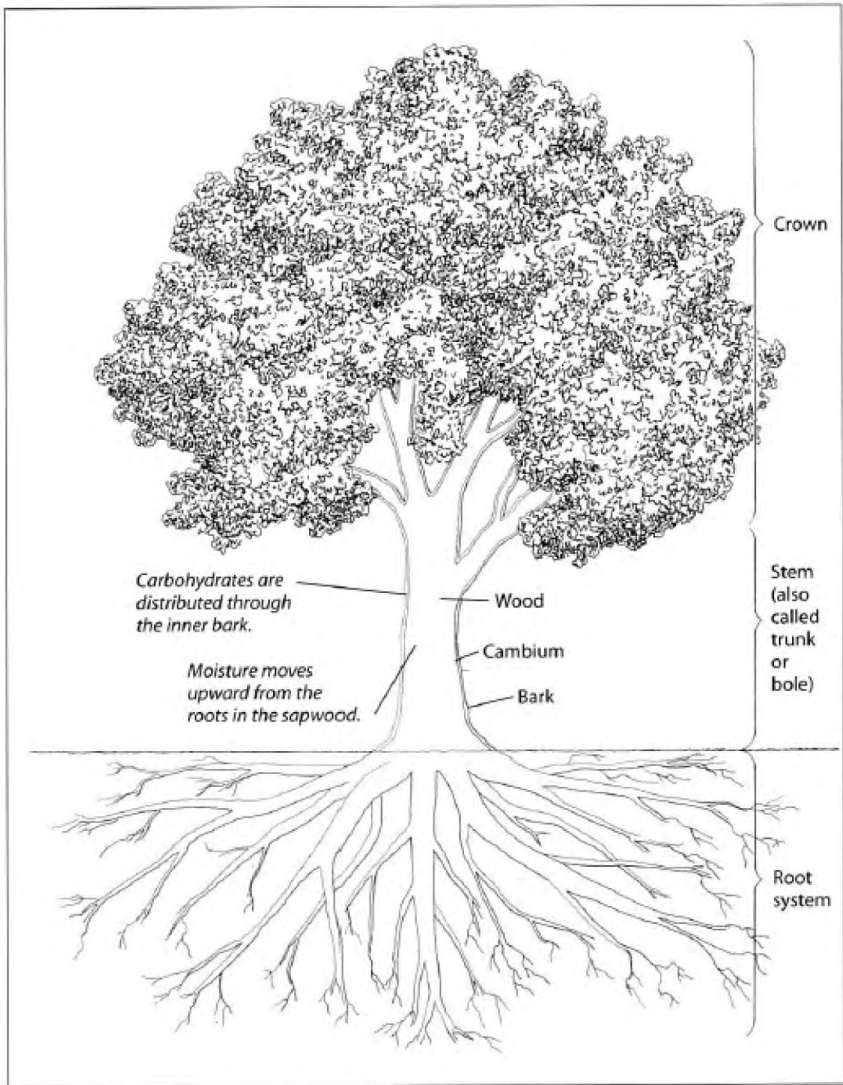
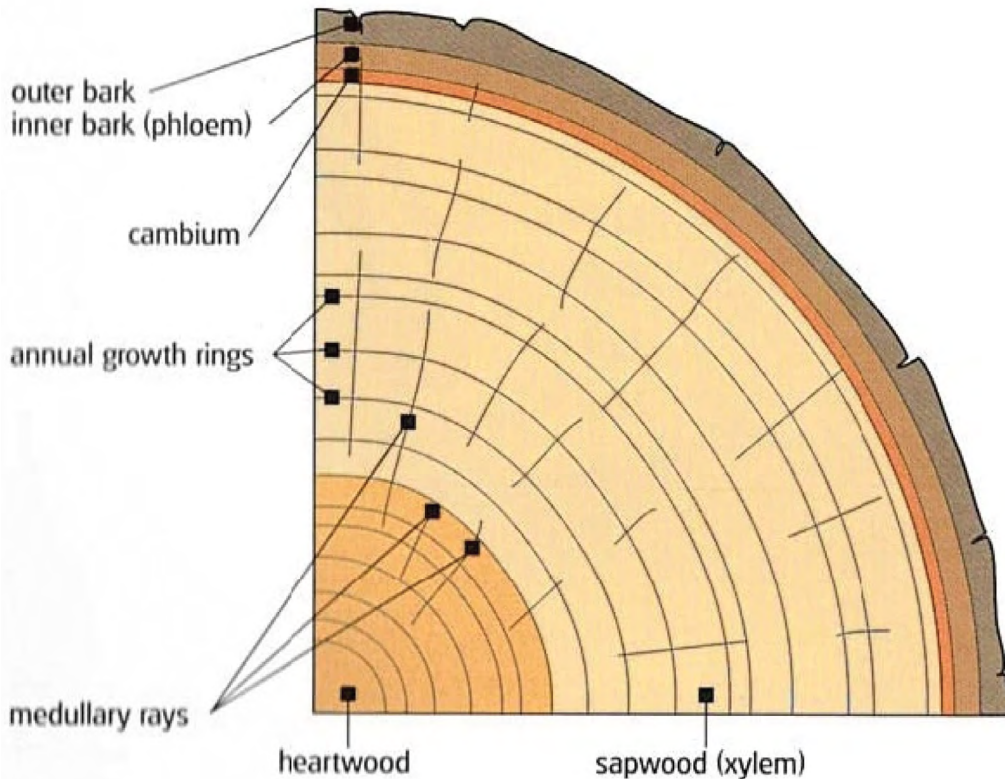


Figure 1.5 • Though apparently static, a tree has a dynamic internal system during the growing season. Water from the soil moves up from the roots to the leaves, bringing moisture and nutrients. Much of this water evaporates to cool the foliage through transpiration. Carbon dioxide from the air and water from the leaves combine with chlorophyll to produce sugar (with oxygen as a by-product). The remaining water and nutrients combine with the sugar to form sap, which flows down through the inner living bark.

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SOFTWOODS VERSUS HARDWOODS

Softwoods have seeds that are not encased called **gymnospermae**. Softwoods are often conifers; trees with needles instead of leaves. Softwood trees are pines, redwoods, spruce, and such. Softwood trees contain two types of cells in their structure.

- 1) **Tracheids** which are longitudinal fibers and make up 95% of the cells
- 2) the other 5% is made up of **ray cells** which radiate outwards from the heartwood which allows sap to travel out.

Hardwoods have seeds that are encased and are part of the **angiospermae**. Most hardwoods are deciduous trees, which are trees that shed their leaves seasonally. Hardwood trees are oaks, maples, beeches, and such. Hardwoods have more cells than softwoods and thus creating a more complex wood.

- 1) **Vessel elements** form a type of continuous pipeline used to transport sap.
- 2) **Wood fibers** have the smallest diameter and have thick walls which create the strength of the wood.
- 3) **Parenchyma** are storage cells for food.
- 4) **Ray cells**.

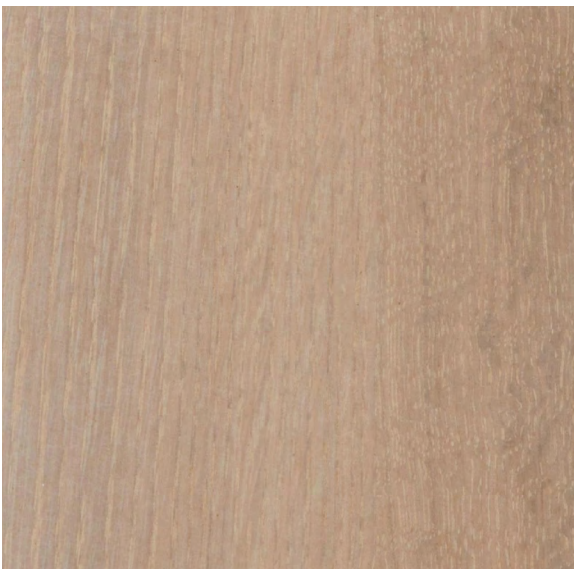
WHAT ARE TANNINS?

Tannins are polyphenol compounds found in certain wood species and plants, which adhere to large molecules such as amino acids, cellulose, starches, and minerals. Wood such as oak is high in tannin content and good at resisting insect and fungal attack. Tannins are brown in color. Hydrolyzable, heat sensitive tannin is found in an oak tree's radial rays, which is used in leather making. Tannins are found in teas, which give the water that brownish hue. Tannins are also used in wine and beer making to separate proteins out.

EUROPEAN OAK VERSUS AMERICAN OAK

There are a series of different American oaks, while only a few species of European oaks with different distinctions among the continental regions. American oak is traditionally cut 3 ways: plain sawn, quarter sawn, and rift cut. However, European oak is cut different which produces a different look. European oak is live sawn, which are straight cuts through the log.

AMERICAN WHITE OAK: QUARTERSAWN



<http://www.preferredcolorlist.com/images/photo-gallery/Spectrum-Quarter-Sawn-White-Oak-Limed-Oak-FC-108.jpg>

American oak has less tannins than European oak does. European oak trees grow taller in height than American oak trees, but not as wide. The benefit of European oak is to achieve boards of longer length, while American oak can result in wider planks. Another distinction between European and American oaks is the coloring and the distinct features in the wood.

European oak tends to vary in color from light tan to deep brown, and has bands of earlywood and latewood. American oak features lighter tones from light tan/pale yellow-brown to dark/pale brown and have a pinkish tint. American oak features grains with swirls, crotch pattern, burls, and tiger-ray flake pattern. European oak tends to have wavy grains that are slightly irregular or cross grain. European oak has a slower growing cycle, thus making the grains tighter. When European oak is quarter sawn the heartwood can show a silver grain.

Although, there are many differences between the two regions, there are some similarities to keep in mind. One of these is that all oak wood has a slow drying period in which special care must be taken to bypass the difficulties that tend to arise. While oak wood is drying it is not uncommon for the wood to check, split, shrink, warp or honeycomb.

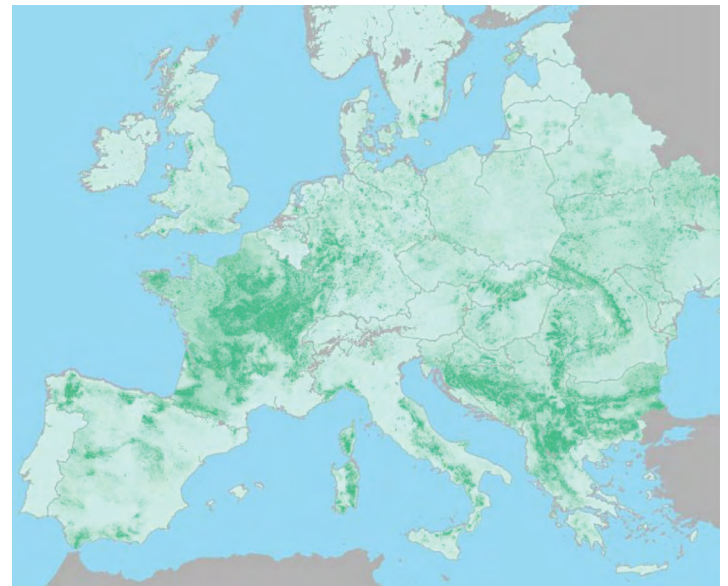
EUROPEAN OAK: QUARTERSAWN



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WHERE IN THE WORLD ARE THE OAK TREES?

In the United States, oak trees are primarily located in the Midwest/Northeast region. While in Europe, as can be seen by the darker green areas, oak trees are primarily located across France, Germany and also in Croatia, Hungary, Romania along with some surrounding areas. Yet, oak trees seem to be spread more widely across all of European's regions.



<https://www.forestry.gov.uk/forestry/infd-8qnk35>

<https://www.fs.fed.us/database/feis/plants/tree/quemac/MapQuemac.jpg>

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