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# Tree Roots

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The basic parts of a tree are the roots, trunk, branches, twigs and leaves. All parts of a tree are important. We focus on roots because of their important role in the riparian (riverfront) environment. They help hold the soil together, slowing down or preventing slumping and erosion. The root system of a tree performs many vital functions. In winter, it is a store-house for essential food reserves needed by the tree to produce spring foliage. Roots absorb and transport water and minerals from the soil to the rest of the tree. Roots also anchor the portion of the tree above ground.

Tree root systems consist of large perennial roots and smaller, short-lived, feeder roots. The large, woody tree roots and their primary branches increase in size and grow horizontally. They are predominantly located in the top 6 to 24 inches of the soil and usually do not grow deeper than 3 to 7 feet.

The old root that is displayed here consists of the larger perennial roots. This root was found on the banks of the Red River after a flood. It probably was from a tree located on the banks of the Red that died after being cut down. After the tree was cut down the soil around the root eventually eroded away and the root fell in to the river. The root went downstream until eventually washing ashore in Lindenwood Park. The feeder roots died and fell off after the tree died and from exposure to water.

The feeder roots, although averaging only 1/16 inch in diameter, constitute the major portion of the root system's surface area. These smaller roots grow outward and mostly upward from the large roots near the soil surface, where minerals, water and oxygen are relatively abundant. The major function of feeder roots is the absorption of water and minerals. Under normal conditions, feeder roots die and are replaced on a regular basis.

Large roots and small feeder roots occupy a large area under ground. Typically, the root system of a tree extends outward past the drip line, two to four times the diameter of the average tree's crown.

Roots grow where water, minerals and oxygen are found in the soil. Because the greatest supplies of these materials usually are located in the surface layer of soil, the largest concentration of feeder roots exists in this zone.

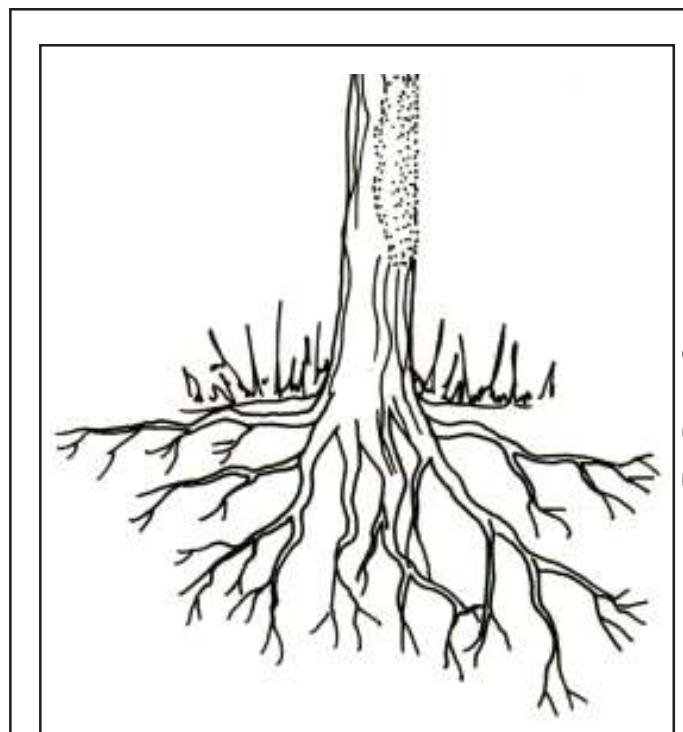
Other factors that determine root growth include soil compaction (reduction in air pockets resulting from soil particles being packed together) and soil temperature. In general, as the depth increases, soil compaction increases, while the availability of water, minerals, oxygen and soil temperature all decrease. In some instances, hard, compacted soil can occur near the surface, which restricts root growth.

There are many ways to injure tree roots and stress trees. Some injuries are unintentional and cannot be avoided. However, most root damage can be avoided with some care. One of the biggest killers of urban trees is soil compaction. Soil compaction restricts water and oxygen uptake by roots, and is associated with roads, parking lots, foot traffic, construction machinery, livestock, poor soil preparation, and other factors.

Changes in soil depth around trees also can cause injury to root systems. The addition of only 4 to 6 inches of soil over a root zone drastically reduces the amount of oxygen and water available to the roots. Removal of soil around a tree can expose and injure roots, change the soil conditions where roots grow, and reduce water availability.

Other causes of root problems include over- and underwatering, improper fertilization, and competition between roots. Overwatering causes the soil pore (air) spaces to fill with water and restrict oxygen uptake. Underwatering does not provide sufficient water for proper root development. Overfertilization can injure or kill the roots, while underfertilization results in a lack of the minerals essential to maintain a healthy tree. Competition for water and minerals between tree roots, bushes, grass and flowers can seriously stress trees. Trees will stress if routine soil preparation for flowers damages tree roots.

Other practices that increase root injury and disease susceptibility are: improper use of herbicides; deicing salts and other chemicals; wounds through digging and trenching; and adding deep mulch, plastic or pavement that restricts or suffocates roots. After a tree is established, anything that changes the soil condition or the oxygen and water supply can be extremely detrimental.



Roots are an important part of the riparian zone.

Tree Disease Concepts