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Roots, Out of Site, Out of Mind

By Larry Figart, Extension Agent with University of Florida / Duval County Extension Service

Photo Credit Larry Figart UF/IFAS

We don't often think about the roots of trees until there is a problem. A forester friend of mine called it a "fencepost mentality". Being underground, they are often out of sight out of mind. However, without well-functioning roots trees begin to decline. The primary functions of roots are to anchor the tree to the ground, store carbohydrates, absorb water and nutrients, and conduct those nutrients to the vascular system of the tree. Having healthy roots to perform these functions is vital. When asked to draw a picture of tree roots, many folks often draw something that looks like a carrot.

With a tap root and small branching roots coming off the tap root. In reality, the root system of a tree looks more like the base of a wine glass with roots growing horizontally coming off of a root flare. There are always exceptions but, in most trees, the tap root usually dies off early in the life of the tree and does not continue growing. Other root myths include:

Roots just grow out from the tree to the furthest expanse of the branches (drip line). This myth has been around a long time. Tree researchers have discovered the tree roots grow 3-4 times the trip line if allowed to. In the urban environment tree root growth is often hampered by sidewalks, streets, and underground utilities.

Roots seek out water lines and drain fields. Simply put, roots grow where the conditions are favorable for them to grow. They do not "seek", however if a root encounters adequate moisture and nutrients as in a drain field, it will grow well. The opposite is true as well. If roots find poorly drained, or compacted soil, their growth will be much less vigorous.

To fertilize trees use the "deep root method". Often folks hire professionals to

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drill deep holes and place fertilizer in the holes to fertilize trees. However, because oxygen is limited the deeper you drill down, most tree roots are in the upper 12-18 inches of the soil. Drilling deep holes and placing fertilizer in in the bottom of the holes is placing the fertilizer below the roots of the tree. The best way to fertilize a tree is to broadcast fertilizer on top of the ground.

As trees grow larger in canopy, the roots are growing along with the canopy to supply the leaves with enough water and nutrients to thrive. Often when we see a decline in the tree canopy it is usually a clue that something is going on with the root system. Construction activities, compaction, and limited root space can all contribute to root problems in trees.

Root damage due to construction activities is one of the largest contributions to tree decline. In many cases fill material is placed over the root systems. This impacts the tree by reducing the amount of oxygen getting to the roots. As roots are starved for oxygen, they die, or become targets for disease. In addition to fill soil damage, I am often asked by folks building a new home or adding on to an existing structure, *"how many roots can I cut without killing the tree"*. The answer is very hard to pin down to an exact number. It all depends on the age, and health of the tree, what size of roots do you want to cut and how close to the tree you need to cut. As a general rule arborists warn against cutting any root closer than 5 times the diameter of the tree. Additionally, the closer to the tree, the larger the root, and the more roots cut increase the chance of not only causing irreparable damage to the tree but reducing the stability of the tree as well.

Soil compaction is another factor that can reduce root health. In a healthy soil 50% of the soil volume is pore space filled by water and air. This is important so that the

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If the soil is compacted, then the pore space is reduced allowing less volume for air and water. Additionally, a compacted soil can make it harder for the root to grow. One way to think about it, if the soil is hard for you to put a shovel in the ground, just think how hard it would be for a root to move through the same soil. Vehicles parking on soil, heavy lawn mowers traveling on the same path, as well as our own foot traffic can compact soil enough to where it inhibits root growth.

Finally, we want our trees to have enough room to grow the proper volume of roots to thrive, but also to anchor the tree. I often see new residential construction where a large tree such as a live oak is planted in the space between the sidewalk and the street. I understand the goal of a future street tree canopy but that is never going to happen unless the tree has the rooting area needed to grow. Often a large tree planted in a restricted root space will either not be as vigorous as hoped, or the tree may not have enough space for anchorage in high winds. A recent study by the Dept. of Agriculture showed us that the average lifespan of an urban tree was only around 23 years. One of the reasons for the short lifespan is the lack of adequate root space. Assuming a soil depth of at least 3 feet, a small maturing tree will need at least 100 (10’ x 10’) square feet of rooting space, a medium size maturing tree will require 400 (20’ x 20’) square feet or more of rooting space and a large maturing tree will need at least 900 (30’ x 30’) square feet or more of rooting space. Although they are shorter than large maturing trees, small and medium maturing trees still provide benefits. Rather than planting a large tree in a confined space living a shorter life span, perhaps we should be planting the smaller maturing tree which is more likely to provide benefits for a longer period of time.

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