Tree Root Situations

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Root systems are vital to the health and longevity of trees. All plants need water, oxygen, and nutrients. These are most readily available near the soil surface where precipitation infiltrates the soil and oxygen from the atmosphere diffuses into the porous soil. Most roots, therefore, especially the important, tiny, absorbing roots, proliferate near the soil surface. The majority of a large tree's roots are in the upper 18"-24" of soil. When space is available, roots can spread two to three times further than the branches. Tree roots are often associated with situations that cause damage to structures, pavements, and utilities. In almost every case, roots are not the cause of the problem.

Roots and underground pipes

Instances of pipes being broken by the growth of roots are rare, but blockage of damaged pipes is not uncommon. As roots enlarge, they may occasionally break the pipes and enter the cracks. More commonly, the pipes fail (especially at the joints) due to age or slight movement of the soil, allowing roots to invade. Moisture and nutrients released from ruptures can stimulate root growth toward the break in the pipe. Once a root enters a sewer pipe, the conditions of aeration, moisture, and nutrients are quite favorable for rapid growth. Species that are naturally found in wet areas such as poplars, willows, and silver maples, are commonly associated with clogged pipes. Blocked sewers usually must be cleared mechanically. Mechanical routing may be needed on an annual basis. Registered chemical treatments are available. The main advantage of these products is that they can be placed into the sewer as a foam for more effective contact with roots; however, it is essential to follow label directions. The only permanent solution to the problem, however, is to replace ruptured pipes. Modern materials and joints should prevent most problems in the future.

Roots and pavement

If trees are too close to pavement, or if compacted soil forces large roots to grow very near the soil surface, roots can eventually lift pavement. When roots encounter a paved area, the only entry is often a gap between the soil and pavement. Future problems can be prevented at the time of planting by using smaller plants, providing a minimum distance of 4 feet between the tree and the pavement, or using mechanical barriers to prevent roots from growing under the pavement. Remedies for lifted pavements around mature trees often involve either moving the pavement away from the tree or pruning off the problem roots (selective root pruning). Barriers are often installed after the roots are cut to prevent re-growth of the roots and recurrence of the pavement lifting. Cutting off the problem roots often causes stress and instability. Trees without sufficient root support can be blown over more easily in a storm.

Roots and foundations

Roots are often blamed for damage to foundations. In reality, roots are rarely the cause of the problem. Though small roots may penetrate existing cracks in foundations, they are incapable of causing mechanical damage through their growth. Soil subsidence can result in damage to structures. Under very special circumstances roots can contribute to this problem. When soils are prone to shrinking substantially during periods of drought, and if foundations are shallow, roots can contribute to depletion of soil moisture under the foundation, causing it to subside.

Surface roots

Major tree roots often grow within a few inches of the soil surface. Some species, such as maples, grow roots particularly close to the surface. Alternate freezing and thawing causes frost heaving, which can expose roots that would otherwise remain below the soil surface. On slopes, soil erosion may also expose roots. These surface roots could become a foot hazard or cause difficulty in mowing, and are easily injured. Removing these roots may disrupt the moisture supply to the tree, causing serious stress. Covering them with soil could cut off the oxygen supply to the fine roots in the soil below. Both situations could lead to decline. The best solution is usually to mulch the area under the tree with compost and/or wood chips. These materials are porous enough to allow sufficient oxygen supply to the soil and may actually encourage fine root growth. Acting as an insulator, the mulch will minimize further frost heaving and erosion. Another benefit is the replacement of highly competitive turf grass with mulch, which supplies nutrients as it decomposes. Grass removal is not necessary before the mulch is applied. If mulch is not an option, raise the soil surface by adding no more than two inches of half-compost/ half-topsoil mix. An additional 2 inches can be added each year as necessary to raise the soil level sufficiently to cover the roots. The lawn can then be replanted, but the tree roots may reappear on the surface within a few years.

Girdling roots

Tree roots that wrap around the base of the trunk can restrict the flow of water and nutrients up and down the trunk, leading to decline and dieback of the crown. Norway maples are most susceptible to damage from girdling roots, but they can occur in most trees. When roots circling inside of a pot in the nursery cause the problem, the tree seldom survives more than a decade in the landscape. On “balled & burlapped” plants, girdling roots develop for different reasons and the decline may take 20 to 30 years to develop. To prevent girdling roots in nursery stock, make sure that all circling roots on the outside of the root ball are eliminated at time of planting. Research shows that moderate disruption of the container root system does not increase stress. For large girdling roots on established trees, correcting the problem can be difficult. Removal of the girdling roots may cause enough damage to the root system to hasten the decline. Several roots may be intertwined, making it even more difficult. It is difficult to predict if removing the roots will be more damaging than leaving them alone.

Grade changes

Roots grow much closer to the soil surface than is often believed. Since roots are near the surface and depend on oxygen, raising the soil level around an established tree can have serious impact. This new soil will drastically reduce the oxygen supply to roots. On the other hand, removing just a few inches of topsoil can also remove much of the tree's root system, severely stressing the plant. When grade changes are necessary, avoid changing the grade within the dripline of the tree. The fewer roots that are impacted, the better the chances that the tree will survive. Another alternative would be to construct a retaining wall outside the dripline to accomplish the grade change. If the grade change is necessary to improve site drainage, be sure to divert the excess water away from the tree.

Severing roots

Balance between the tree's crown (top) and root system is important for maintaining healthy trees. When roots are lost for any reason, the imbalance creates stress. A tree usually has 4 to 7 major roots. Cutting just one of them within a few feet of the trunk can remove up to 25 percent of the root system. In such situations, giving the tree extra water during summer dry periods and thinning the crown may help to minimize decline. During temporary excavation, such as for utility installation or repair, significant root loss may result, but if the soil is replaced soon afterward, roots can regenerate into the replaced soil and recovery is more likely. Extra care (primarily watering) will be required for many years during the restoration of the lost roots. When underground utilities must be installed close to a tree, tunneling or auguring under the root system avoids damage altogether.