Root Pruning

Prior to root pruning, one must first decide whether or not the tree is worth risking the effects of root cutting. During and after the examination of the tree's health and vigor, structure, shape, and balance, the information should be documented. Some trees will survive root pruning without any additional care while others will die within due time. The wisdom lies in determining the vigor and stored carbohydrate level of those trees that have the potential for surviving the root pruning but will need follow-up care to do it. Arborist must be knowledgeable in hazardous tree evaluation and know what to look for, especially when it comes to root examinations.

Reasons to Root Prune

Root pruning will occur in four basic situations:

- If a tree is being transplanted.
- If construction is occurring near the tree.
- If the roots are being removed from under, or near, a curb, sidewalk, or other infrastructure item.
- To develop a highly fibrous root system for nursery stock and future planting in urban soils.

Whenever a tree will have a substantial portion of its root system removed, a thorough site analysis should be performed. This would include data being taken on wind potential, direction, and velocity.The distance and location of potential targets should be noted. The site should also be examined for drainage and excessive moisture that can play a significant role in wind-throw potential and root rots.

A critical concern when dealing with root pruning is whether or not the tree will survive. Arborists must have knowledge of the root spread, growth habit, and root aggressiveness of the species.Root pruning should be done as seldom and as far away from the trunk as possible.Low vigor trees may require substantial increases in the minimum distances required or tree decline and/or liabilities may result. Severe root pruning should only occur on one side of the tree in any one-year or tree stability and anchoring may be jeopardized.

Construction Standards

When construction is occurring within 10 feet (3 m) of a tree, the following rules should apply:

- For tree trunks measuring 12 inches (30 cm) in diameter or less, soil excavation work or root cutting should not occur closer than 3 feet (1 m) from the outer bark of the tree.

- For tree trunks measuring greater than 12 inches (30 cm) in diameter, soil excavation work
- Soil excavation work may be done closer than the distance parameters established under the above two categories, provided all excavation of soil is accomplished by hand or with an air spade and no roots greater than 2 inches (5 cm) in diameter are severed, unless the project arborist instructs otherwise. If it is not feasible to perform any of the requirements established above, stronger consideration should be given to removing the tree.

If removal of the tree is required under life-threatening or related emergency situations, remove it immediately but carefully. If more than 50% of the tree's roots have to be removed, or if more than 30% have to be removed from one side, the tree may need to be removed. The same rules should apply when pruning roots from under a curb or sidewalk.

Root pruning can be accomplished in two methods:

- Selective root pruning – preferred – excavate the soil away from the roots and carefully select the roots to cut and prune like the branch of a tree.
- Non-Selective root pruning – not recommended – no real excavation required; get an effective piece of equipment and start cutting.

Cuts

Roots that have been ripped and torn with backhoes typically leave a large amount of root surface exposed to pathogens and unnecessary drying.Clean cuts are an absolute necessity if quick compartmentalization of decay is desired. After pruning, it is essential that cut roots be back-filled as quickly as possible. Small feeder roots can die in less than 10 – 15 minutes with larger roots dying in less than an hour.Hot, dry, and windy conditions warrant extreme expediency in backfilling.

Timing

From the standpoint of wound closure and health, the best time to conduct root pruning would be just prior to active root growth which occurs in early spring before bud break and late fall in temperate climates. Root pruning should be avoided during environmentally stressful times such as droughts, floods, active bud break, and shoot growth due to the water and nutrient demands that are placed on the root system during these times.

Porous Species

Due to the differing vascular system of many species, it is important to know the difference between ring-porous and diffuse porous species of trees.

Ring porous trees (such as an elm, ash, oak, chestnut, and black locust), are angiosperms that have large diameter vessels in the first portion of the growth increment and vessels of smaller diameter later in the growth increment. The vessels of a ring porous tree are generally larger and concentrated in the outermost layer of sapwood.These vessels are produced early in the season, laid out in concentric circles, and copiously absorb water in the early growth season after which they close down. Ring porous vascular systems are very efficient, but are much more vulnerable to blockage. For many ring porous trees, severe root pruning on one side of the tree may result 'in a loss of major branches on the same side that the roots were cut rendering the tree aesthetically unsightly. In this situation, if retaining aesthetics are paramount, root pruning should not be done.

Diffuse porous species (such as a birch, maple, cherry, poplar, beech, sycamore, honey locust, tulip tree, pine, spruce, ginkgo, and fir) may also be affected from root pruning but will manifest itself throughout the entire tree.Diffuse porous trees are angiosperms that have vessels of about equal size and diameter arranged at about equal distances from each other throughout the growth increment Diffuse porous wood has vessels, parenchyma, and fibers of about the same size arranged equally throughout the entire growth increment. These vessels are produced regularly during the growing season. They take up water during the entire growth period.

Follow-up Care

There will need to be a continued commitment for supplemental care and observation after root pruning. Maintaining adequate soil moisture, nutrition, and aeration following root pruning is critical if quick wound closure and root regeneration are desired. The duration of continued maintenance should depend on the tree's root reestablishment rate. Though the roots of many trees can grow up to 15 feet (5 m) per year under ideal conditions, this is rarely the case in most urban soils.Hence, monitoring of vigor should be conducted to determine when supplemental care is no longer needed. Whenever public trees are being severely root pruned, it is wise to provide periodic inspection for usually 1 – 5 years with twig growth and other vigor indicators used to determine adequate reestablishment.

Root Barriers

Root barriers are used to deflect tree roots deeper into the soil where they will cause less damage to infrastructure (driveways, foundations, walks and curbs). In ideal soil conditions, these barriers work very well. In poor soils, the results are not as good. Critics of root barriers insist that tree stability may be jeopardized if horizontal roots are not established (on some tree species) within 8 feet of the trunk. Proponents of root barriers say that while this may be true for some species, it may take 20 – 30 years for the problem to become a concern.

Researchers have found that barriers with vertical ribs do in fact direct root growth downward and protect hardscapes but then the roots may grow toward the surface once the barrier is cleared. Root barrier installations are most effective when installed as a preventative measure prior to the need to cut a root that has outgrown its limited soil area.

The use of a barrier will be different for each location based on soil type and depth, species, slope, moisture, and other soil environmental factors. Each time a root is cut, a barrier should be placed to deflect the growth of new regenerated roots from the cut end. Otherwise, the roots may grow right back to the areas that they were cut from.

There are some basic types of barriers used to direct roots away from infrastructure and to encourage the roots to grow down and/or away from surface hardscape.

Physical Barriers

Years ago, there were many types of barriers in use such as concrete panels, sheets of plastic, tar paper, bottomless containers and chemicals. Then came the development of the 90º, raised rib molded plastic panels.They are generally made of semi-rigid plastic 60 – 80 mm thick. One material is polyethylene, which is considered to have superior durability.Another plastic material is polypropylene, which is harder, and still another is polystyrene, which is an older product that will break down when exposed to the ultraviolet light. All of these plastic barriers are built as panels and are connected together with interlocking couplings, locking strips or are held together with bonding glue.These barriers are placed into planting holes around the tree or in a linear fashion along one side of a planting between 12 – 24 inches (30 – 60 cm) deep. The vertical ribbed panel is the most commonly purchased barrier.