Girdling Roots

It is essential that in order to have a well-developed healthy tree, it must have well developed healthy roots. There should be five to seven large roots radiating out from the trunk. If a tree has less than 5 lateral roots or any root defects, the tree can exhibit poor growth, disease and pest susceptibility, and a shortened life span. Trees with girdling roots tend to decline over a 5 – 10 year period. To avoid girdling root problems when purchasing trees, check the root systems before planting and only accept trees with well-distributed root systems that are without kinked or circling roots.

Stem girdling roots are those roots that grow either partially or completely against the trunk and compress the stem tissues. Xylem and phloem tissues in the stems become much smaller in diameter at the points of compression, compromising the transport of water, nutrients, and food. Trees become stressed and more vulnerable to secondary problems (drought or insect attacks). Often, the compressed areas of the stems are weak points and far too often are points of failure during windstorms.

Symptoms

The symptoms associated with girdling roots are caused by a weakened root system. The crown of the tree may be thin, with stunted growth. In advanced stages, a girdling root problem will cause the trunk to become flattened along the side where the strangulation is occurring. The problem roots are often found at or within a few inches of the surface. Borers and cankers in the tree are also symptoms of root problems along with a general decline in the tree's vigor. Trees with severe girdling roots may lean or completely break off.

Causes

The development of girdling roots is not well understood, but it is normally thought to be the result of unfavorable conditions that prevent roots from growing out in a normal spreading manner. Girdling roots seldom occur in nature. Girdling roots usually develop at the nursery when a tree has been left growing in a round container for too long. Girdling roots can also be induced through the use of root barriers and containers of soil-less mixes that form an interface discontinuity with the backfill soil after planting. Girdling roots on field grown stock are usually the result of transplanting and the primary roots being cut. In this situation secondary roots begin growing in dominance with the loss of the primary root. Normally these secondary roots would have died, as the primary root grew larger. The secondary roots often grow perpendicular to the primary root and are close to the trunk. Restricted root space, such as tree pits in urban areas, also may result in girdling roots. There is some suggestion also that constant mulching, a desirable practice in many respects, may cause the formation of girdling roots, if the mulch is too close to the trunk.

For plants susceptible to root girdling, an inspection should be made several times before the tree is six inches in diameter. Digging the tree up and exposing the roots is the only way to make a positive diagnosis. Using an Air-Spade®, the soil is carefully removed to a depth of at least 12 inches (30 cm), with care taken to prevent serious mechanical injury to the roots. If girdling roots are found, they must be removed.

If the inspection reveals girdling roots, and a considerable amount of damage, the most prudent move may be to replace the tree. Spending money on a weakened tree that subsequently dies can be an extremely frustrating experience. Because correcting this problem is so labor intensive, the costs and benefits should be weighed carefully prior to making any decisions.

Prevention

Treatment of girdling roots begins with prevention.

- When planting, loosen and straighten any potentially circling roots.
- Be sure the planting hole is wide, allowing ample room for the root system in all directions.
- The sides of the planting hole should be loose and roughened, to allow root penetration into surrounding soil.
- The soil type in the root ball should be similar to the soil type at the planting site. If the soils are not similar, remove all the soil from the root ball and plant the tree as bare root.
- Be sure plants are planted at the proper depth and mulched lightly.
- Some nurseries recommend root pruning at the time of transplanting is an absolute must for any container grown tree or shrub that has circling roots. Three to five slashes must be made vertically down the root ball and about an inch into the root ball. One or two slashes into the bottom of the root ball must be made at a depth of three to four inches. Some people go further by fraying out the pruned roots. If these roots are not pruned at the time of transplanting, inadequate root systems develop. Young trees
  planted with kinked, entwined, or circling roots continue to grow in the same manner and eventually girdle the tree.

Tree Case Management