

Root Tips

Trees live in two worlds. They reach up from the ground into calling light, and in that reaching attain great beauty. But trees also grow downward into nourishing darkness, into a complex ecosystem inhabited by fungi, worms, and multitudes of micro-organisms. This below-ground world is essential to the life of trees, and soils, like other ecosystems, can be healthy or ailing.

When soils are sick, plants suffer. Among the many micro-organisms in soils are some which harm trees. However, trees have natural defenses (like our immune systems) to fight disease. To muster their natural defenses, roots need oxygen. A lot goes on in the root systems of plants: Roots are constantly growing, absorbing water, shutting in minerals, storing sugars, and producing chemical defenses. All this activity requires energy, and therefore oxygen. Undisturbed forest soil has a concentration of 16-22 percent (22 percent is the concentration in the atmosphere). Forest soils are air rich because leaf litter forms a natural layer of mulch in which there are many tiny air passages.

Urban soils tend to be tough places for trees to live. Over time, foot traffic collapses air passages and compacts soils thereby reducing their porosity. Without sufficient oxygen it's hard for trees to mobilize the defenses needed to fight the plant diseases common to most soils.

These are things we can do to foster healthy soils to improve tree health. The first is to change our way of thinking about trees and realize that roots are vital and need care. We can avoid further compacting our clay soils by locating footpaths away from important root areas. Don't pile soil up against the trunks of trees, and if they have been buried in the past then dig them out to the point where the roots flare from the trunk. Buried trees are vulnerable to many fungal diseases.

For long-term soil improvement, it's a good idea to mulch. Soil under a layer of mulch gradually becomes more porous. Mulch feeds beneficial micro-organisms that make pore space. Also, the biochemical properties of mulch cause soil to coagulate into aggregates with spaces between the aggregates. Next time you're in the woods, scrape back the leaf litter and notice how crumbly the soil seems. These crumbles are the aggregates. Mulching increases soil porosity over time.

If a tree is ailing, you may need a faster way than mulching to get oxygen to the roots. Aeration, sometime called vertical mulching, is a technique of drilling holes into the top couple of feet of a compacted soil. We aerate using water pressure, and then loosely fill the holes with compost. Aeration increases the O₂ content of the soil and provides an environment which encourages earthworms and other beneficial soil organisms to further improve the soil.

Though aeration and mulching are not magic cures, they can tip the balance in the tree's never ending struggle with root diseases. The beauty and longevity of our trees depends on a healthy world underground.