

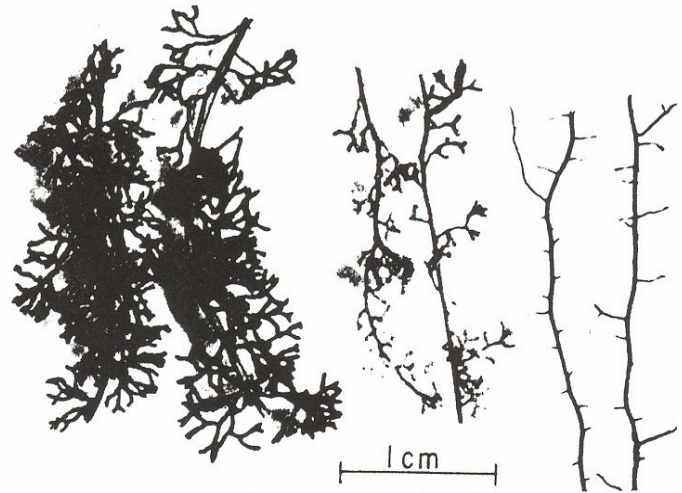
Root Issues

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It is hardly ironic that the tree parts that are least visible and least available for inspection, evaluation, and treatment are also the parts that are the most important for the total health of the tree. While this is often the physiological and functional case with most living organisms, we too often forget to look for trouble where it most frequently starts. Irregularities or decline in a tree's canopy is commonly a singular visible indicator of trouble elsewhere. Very often these symptomatic foliar indications appear only after the casual infection and damage below ground is well-advanced and beyond effective remedy.

Contrary to still-popular belief, tree roots do not grow deep into soil. In fact most tree roots remain in the top 18' (45cm) of soil and very often. Especially in heavy clay soils, those roots are found in the top three to four (3'-4') inches of the soil. This fact predisposes them to a variety of damage-inflicting hazards and events.

Further, most plant species employ the beneficial information and presence of special fungal organisms called **Mycorrhizae** (lit. *fungus roots*) to carry a large part of the responsibility for nutrient and water absorption processes so vital to life and for protection from soil-borne pathogenic root fungi. The decline of mycorrhizal presence by way of soil compaction, removal of biotically-alive organic layers/materials, and excessive water contributes in turn to creation of a soil environment ripe for trouble. Low vigor wounded trees are the first to fall.



Ectomycorrhizae on three loblolly pine seedlings. Note Abundant branching and swollen feeder roots in the two Samples (left, center). Roots at far right are similar to nonmycorrhizal roots. (Photo courtesy of Don H. Marx, USDA, Forest Service, Athens, Georgia)

Generally, dry conditions retard fungal advance. Conversely, dark, prolonged wet and excessively shady places can become incubator environments for establishment of pathogenic fungal organisms that do not require light to grow. Excessive shade can also inhibit photosynthetic processes that weaken the plant and further increases its susceptibility to pathogenic invasion.

Distinction should be made between **Root Failure** and **Soil Failure**. For example, removal of soil anchorage by way of grade cuts, footing lines, etc, are instances of man-initiated hazards that (initially, at least) do not necessarily involve disease-compromised root systems.

White Rot: Compose approx. 90% of root disease occurrence
Degrades everything, including lignin
Early stage infected wood retains much of structure and strength
Is localized to hyphal presence or area(s)

Brown Rot: Compose approx. 10% of root disease occurrence.
Does not impact lignin
Involves rapid wood strength loss
Has structure but is friable