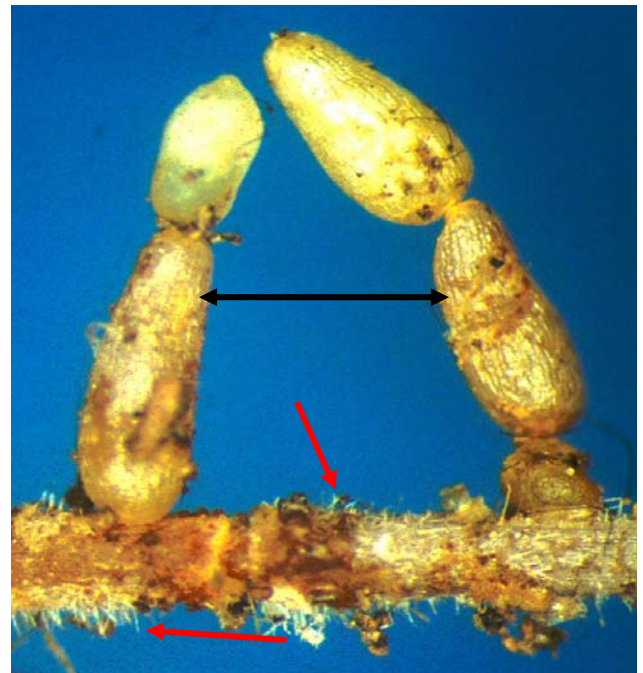


ROOTS THE PLANTS BRAINS

Roots are the brains of the tree. It's the roots that drive all the processes within the tree. The root systems of trees are symbiotic with specialised fungi. These fungi, mycorrhizal roots, *black arrow* and the hair roots, *Red Arrows* connect with the soil colloid to absorb water and nutrients.

More importantly, however, the roots produce chemical messengers that tell the crown what to do. There is no point in the crown of the tree flushing into growth if there is inadequate water and nutrients to sustain the growth. The amount of growth and foliage produced is directly controlled by the production of these chemicals.

Root systems are composed of numerous iterations, often occurring at a different time to the crown. This enables trees to manage their energy requirement and build nutrients during crown dormant periods. All plants have active and dormant periods; the extent of this varies with plant species and phenology. While dormancy is barely noticeable in the tropics it is obvious within the cool regions.



Roots cannot travel for miles to exploit the soil medium - they have a finite volume of soil to exploit for most of their water and nutrient needs. Foliage will absorb water and nutrients delivered by rain and dew point. However, in most cases, the majority of water is absorbed through the roots. A tree's roots must compete with other plant within the root plate volume, many competing plants, such as grasses, exude chemicals that preferentially favour their root success over those of the tree's.

Roots within the finite volume grow, die and are colonised by new iterations. Just as the crown generates new iterations, within its finite airspace. A Tree's potential root system exploitation area diminishes, as old surplus roots die but do not rot fast enough, to provide recycled space new root growth iteration. This lack of space over time leads to starvation and death of the tree. Trees can only die through starvation. The removal of sections of the root plate can provide a way of providing continued space for important and valuable trees. The root plate volume can also be increased, by the topical addition of shallow layers of soil or organic mulches.

Trees live in a constant battle between life and death. Energy is what sustains all living organism – including the tree. If the tree has greater life energy then that of the pressure of death organisms, the tree will prosper. The organisms that are pressuring the tree to die are doing so in order to complete their life cycles. Any chance they get to improve their success, they exploit to the full. If they are successful, it will lead to the starvation death of the tree.

What is important to remember the **ONLY** way a tree dies is through starvation. Trees grown a new tree on the outside of old trees, with each growth increment. Short lived plants, still exist today after centuries of vegetatively propagated. The renewal of space is what determines longevity.