



# Harmony Arboriculture

## **'The Importance Of Tree Roots' by Harmony Arboriculture**

*Why care should be taken below ground as well as above.*

Tree roots are often overlooked and misunderstood. Because their nature is to remain underground they are sometimes ignored and thought of as being unimportant to the vitality and health of the tree. Also, because tree roots can often spread out and be numerous, it is sometimes believed that the tree can 'do without' some of its roots.

### **Root size, depth and spread**

It is sometimes thought that tree roots mirror the size and spread of the crown. However, this is a common misconception, as root size and spread is often defined by the ground conditions the tree is growing in. For instance; a tree growing in well drained, soft brown earth will have a well developed root system, whereas a tree growing on a hard, shale bank may have a stunted root system.

In most cases tree roots are comparatively shallow and spread far beyond the crown of the tree. Roots will spread out in order to locate water, and if the only source of water is located ten metres beyond the tree in one direction then that is where the roots will head.

Often the majority of tree roots (80-90%) are often found within the top 60cm (2 feet) of the soil profile. The vitally important root hairs can often be easily uncovered, and are susceptible to damage from construction or other civil engineering activities.

Changes in the depth of soil surrounding a tree can have serious and sometimes fatal consequences. A tree grows according to the conditions and environment that it is in. Having a root system so close to the surface enables the tree to absorb vast quantities of water before it is lost through gravitational flow, surface evaporation or from absorption by other plants and grasses. If the soil level is increased around the tree then water becomes less available to the roots, as they are now buried further than the water can reach. Essentially this leads to drought conditions and tree failure. (Similarly, paving or laying tarmac around a tree will also reduce water availability to the roots). A reduction in soil level, e.g., through excavation, can expose the roots to injury and damage, leading to possible infection from soil, water and air borne organisms. Therefore it is essential that the soil level around trees remains unchanged.

### **Tree roots have three major functions**

#### *1. Anchoring the tree to the ground*

Roots are vital to the support and stability of a tree. They advance their way through the ground, clinging on to rocks, boulders and weaving their sinewy tendrils in between tiny cracks and crevices. The weight of the tree is diffused through the root plate and into the soil so that the tree does not sink. During storms the roots spread the force of the wind, keeping the tree from uprooting. Only in exceptional circumstances does the loading become too great for the roots to manage and failure soon follows.

\*Damaging or severing roots can result in a loss of anchorage of the tree.

## 2. Absorption of water and nutrients

Trees need water and nutrients in order to survive, and the tree absorbs these from the soil via the roots. The root system is comprised of thick, woody stems and fine root hairs, located at the ends of the root tips. It is the root hairs that absorb water and soluble minerals in the soil and the thicker stems transport the water to the tree.

The area of soil immediately surrounding the root hairs is known as the *rhizosphere* and is of vital importance. Within the delicate rhizosphere a special symbiotic relationship takes place between the tree and beneficial fungi called mycorrhizae, or beneficial bacteria called prokaryotes. Both these relationships benefit the tree by helping it absorb nutrients it would otherwise find difficulty in absorbing. In return the fungi or bacteria receive a little bit of energy back, so helping them survive and continue benefiting the tree.

\*Damaging the roots or disturbing the rhizosphere will reduce the efficiency with which the tree can absorb water and vital nutrients.

## 3. Storage of energy

During winter in the UK there is insufficient light for trees to carry out photosynthesis and produce energy to keep itself alive. For this reason deciduous trees go into dormancy and shut down for the duration of the winter. In order to survive dormancy the tree needs to store enough energy during the summer to feed itself until the following spring. Throughout the summer the tree uses photosynthesis to produce sugars and starches which it uses to grow, flower and produce seeds and/or fruit. The tree does not use all the energy it makes, but stores the remainder in the root system ready for the winter months. Come the following spring the tree can successfully start the whole process again.

\*Damaging or removing roots can deplete the tree's reserves, leaving it prone to failure due to lack of energy.

## Tree roots and buildings

Trees very rarely cause considerable damage to sufficiently built structures such as houses. Where tree roots have been seen to be the cause of damage it is usually due to the fact that the root has taken advantage of a problem such as a leaking water pipe or insufficient foundations. When coming up against a solid obstruction a root is likely to find its way around it than expend energy trying to break through it.

Subsidence can be a problem where trees are located next to buildings on heavy, shrinkable clay soil. In summer when the tree absorbs a lot of water from the saturated ground this can lead to shrinkage, causing the soil to come away from walls and foundations. Conversely, if the tree was to be removed then any excess water that the tree may have absorbed had it remained in place now has nowhere to go and can lead to waterlogging.

Fences, sheds, garden walls and other structures built without solid foundations may suffer from heave brought about by tree roots, hence considerations should be made before deciding what to build and where.

## How to care for tree roots

- Trees rely on natural biological activity and the breakdown of organic matter to add essential nutrients into the soil, e.g. organic waste, dead flora and fauna, natural aeration. If there is a lack of biological nutrients then providing chemical or organic feed is required.
- Drought and flood conditions can seriously affect tree health and associated symptoms can sometimes not show until years afterwards. Under-watering and over-watering should be avoided.
- Soil compaction can lead to a reduction in the amount of water, nutrients and oxygen available to the tree. Avoid this problem by keeping human and vehicular traffic away from tree roots.
- Plan any construction or digging works with trees in mind. In the UK planning and construction companies must adhere to British Standard BS5837: *Trees In relation To Construction* to avoid damage to trees, or to buildings.