

## WHAT IS SOIL COMPACTION?

Compaction is when the soils bulk density increases while removing air from between the soil pore spaces. This process can occur naturally due to heavier top soils or fine particles moving down the soil profile and is referred to as consolidation (Roberts et al, 2006). It is the result of man-made alterations to the soil layers. It can be done intentionally to improve the strength and stiffness of the soil to ensure it is able to cope with the loads, buildings or roads for example, being placed upon it. It also occurs unintentionally, especially on construction sites where heavy vehicles and plant machinery are moved over and back across the soil surface. But soil compaction can also occur on green areas or parks where high volumes of foot traffic are present.

## HOW DOES IT AFFECT TREE ROOTS?

Soils are composed of mixtures of sand silt and clay particles. These three soil mineral particles vary in sizes from the largest sand to the smallest clay. Different percentages of each create a soil texture. And the way in which these different particles join together to form aggregates is referred to as soil structure. It is the formation of the structure that creates the pore spaces between the aggregates and these are called macropores and micropores (Ashman & Puri, 2008). Micropores are essential for allowing microscopic root hairs, mycorrhizal fungi and bacteria inhabit the soil and allow them to recycle plant nutrients and take them into the tree roots (Roberts et al, 2006). Macropores allow the movement of water and air through the soil while at the same time provided tree roots with the space to spread and develop. Tree roots access water and nutrients within the macropores and supply them to the tree. Tree roots and soil organisms also require the oxygen that is present within the macropores.

When the soil around the tree roots is compacted it reduces the pore sizes and therefore restricts the downward flow of water through the soil profile, reduces soil aeration and restricts the spread and development of tree roots. This will then affect the root's ability to access essential water and nutrients and will in turn affect the tree's ability to photosynthesis. Compacted soils around root systems can lead to the decline and even death of trees above ground (Roberts et al, 2006).

## HOW TO MANAGE SOIL COMPACTION NEAR TREE ROOTS

There are a number of proven methods for de-compacting soil around tree roots without causing them damage (Roberts et al, 2006):

- Radial Trenching – where soil is removed from trenches that are dug outward around the tree
- Hydraulic excavation – where high pressure water is used to drain the soil away
- Airspade – this is where high pressure compressed air can remove the soil from around the tree roots without causing damage to the roots
- Air injection – compressed air is injection into the soil creating fractures in the compacted soil layers

With the exception of Air Injection the removed soil will be replaced with improved structural soil that will allow better water drainage, water storage, soil aeration and the ability for roots to spread and develop. We offer both Air-spade and Air Injection services to restore the soil and trees back to good health.

## REFERENCES

Roberts, J., Jackson, N. & Smith, M. (2006) Tree roots in the built environment. Research for Amenity Trees No.8. Department for Communities & Local Government. TSO (The Stationery Office)

Ashman, M.R. & Puri, G. (2008) Essential soil science : a clear & concise introduction to soil science. 6 edn. Blackwell Science Ltd

<https://www.pacifictrees.ca/news/2018/1/4/soil-compaction-on-development-sites-a-remediable-tree-killer>

<https://rtectreecare.com/soil-compaction/>