

Using Soil Biology to Remediate Soil Compaction under Established Fig Trees

City of Sydney Council – Victoria Park - Sydney NSW

The drought that affected Sydney from 2001 through 2007 put a significant amount of stress on open space landscape areas, including many mature trees. The figs that line the Eastern side of Victoria Park, along City Road at Broadway were amongst those exhibiting significant dieback and defoliation.

Pre treatment inspection and analysis revealed a number of potential issues the most pressing of which was soil compaction which had reached a point where it was restricting root growth and reducing the infiltration and use of limited rainfall events.

An onsite analysis included a series of soil tests (Physical, Biological and Chemical) to qualify the problem. Penetrometer tests revealed that the soil around the drip zone of the trees had become severely compacted, readings were taken from the base of the tree as well as further out in the drip zone due to mulching work that was also planned independently of any Soilsmart treatments.

Biological assays showed a predominance of anaerobic organisms, as well as a distinct lack of beneficial fungal resources in the soil. Interestingly soil chemistry analysis revealed very little (showing only minor deficiencies), and were not able to provide any tangible explanation for the problems being experienced.

As a result of the tests the trees were treated (over a 6 month period) with a biological 'maintenance' program which included GranoVerm and Soil & Plant Tonic in conjunction with BioGrow, applied with the drip zone. The program was targeted at rejuvenating the beneficial soil organisms capable of rebuilding soil structure and thus relieving compaction and anaerobic conditions.

Following the completion of the program penetrometer analysis and biological assessment was conducted to verify soil structural changes (these results are summarised in the tables below).

Penetrometer measurements up to 300psi indicate a soil where adequate root development is possible, above 600psi root elongation will be impaired.

	Treated	Untreated	Increase
Average depth to 300 psi - Base of tree	125 mm	35 mm	257%
Average depth to 600 psi - Base of tree	275 mm	100 mm	175%
Average depth to 300 psi - Drip zone	90 mm	18 mm	400%
Average depth to 600 psi - Drip zone	225 mm	75 mm	200%

Penetrometer data from treated trees were compared with pre treatment readings and against untreated trees and revealed that soil compaction had been dramatically reduced. Biological assessments compare pre and post treatment measurements and reveal a significant increase in much needed soil fungi and a reduction in Ciliate levels (an indicator of anaerobic conditions). The general health and appearance of the trees also reflected the improvements in soil conditions.

	Active Bacteria	Total Bacteria	Active Fungi	Total Fungi	Hypthal Diameter	Mycorrhizal Colonisation	Nematodes	Ciliates
Desired Level	5 - 15	100 - 300	25 - 50	600 - 3000	>2.5	40 - 80%	50 - 75	25 - 50
Mar-06	54.4	125	0	173	3	21	1.68	1736
May-07	19	124	11	324	3	29	2.61	412
% Change	-65.07	-0.80	1100.00	87.28	0.00	38.10	55.36	-76.27

The Soilsmart choice

Soilsmart products and technical services are specifically designed to help manage one of the most complex and diverse eco-systems on earth - the interface between the soil and the plants we grow.

Soilsmart products will help you to build a strong and balanced biological soil eco-system, maintain aerobic soil conditions and develop a disease suppressive environment in the root zone.

Biological Diversity

The plants we rely on to grow quality crops, turf surfaces and landscapes all evolved in the presence of, and rely on, a strong and symbiotic relationship with beneficial soil organisms which play a significant role in regulating the health of the entire plant/soil eco-system.

The key to success however is diversity - nature is built on it — consequently we have developed a range of products and programs that have a broad bio-diversity and offer long term benefit. They are also based around indigenous Australian biological species which are suited to our climatic and soil conditions.

Even small changes to your existing programs can improve biology and quickly translate into improved aerobic soil conditions and healthier and more resilient plants. These advances also result in more extensive and vigorous root systems and an increase in water use efficiency. Maintaining bio-diversity and balance also encourages the conversion and retention of minerals, increasing fertilizer efficiency and minimising the need for repeated applications.

Soilsmart products and programs allow you to stay ahead of pests and disease and offer a truly preventative approach to soil and plant health by:

- Building Organic Carbon reserves in your soil.
- Establishing a natural defensive network against disease and pests.
- Strengthening plant health and stress tolerance.
- Increasing fertilizer efficiency.
- Sustaining soil Oxygen levels.
- Reducing costs and improving risk management.

The science that enables us to measure and manipulate the soils' biological properties has advanced rapidly in the past decade, bringing about a much better understanding of how we can influence this very complex bio-system to our advantage. Soilsmart have maintained an association with and are accreditation with organisations like The Soil Foodweb Institute USA, who are at the forefront of research and technology development in this important area of environmental management.

