Penetrometers

OVERVIEW:

A penetrometer is designed to provide a measurable indication of the hardness or compaction in soils, composts or other media at various depths or levels. In soils, compaction inevitably impacts greatly on plant growing potential because of the restriction to root growth, and the ability of soil life to reach its capacity in any growing system.

Compaction can be a function or result of the natural layering of the soil, natural or man-induced chemical conditions in the soil, mechanical impacts by hoofed animals and machinery or result from extreme environmental conditions.

Apart from creating a physically hard barrier difficult for plant root penetration, a compacted soil is devoid of most air and water since all the solid soil particles are bound very closely together. (A good productive soil will have 25% air, 25% water holding capacity with the remainder being minerals, organic matter and soil biology.) Without air and water, plant roots do not grow well but also importantly there is no suitable habitat for aerobic microbes and other beneficial soil organisms in which to perform their jobs of supporting healthy plant life.

Why use a Penetrometer:

Just as the roots of a plant experience resistive pressure as they grow, a penetrometer is pushed into the soil to gauge the resistive pressure measured in psi (pounds per square inch) exerted against it at various depths.
Research has shown that less than 200psi (138 Newton/cm2) enables good root development to take place in soils. When the figure is 300psi (207 Newton/cm2) very poor growth by most plant species will occur.
The fact that the soil is dry will impact on the results making them higher in value. A good friable healthy soil, when dry, will show less resistance to penetrometer insertion than a compact soil even when saturated to field capacity.
Penetrometer readings are often taken and recorded when sampling of soil for analysis takes place. A plan of the paddock(s) mapping out soil types and locations (GPS, transects, distance from landmarks such as gates, trees etc) for sampling will be helpful when it comes time to work out a strategy with the information

gathered. Remaining clear of tracks and gates, stock camping spots, under trees and areas recently cultivated will give a better indication of compaction effects across the paddock.

Using a Penetrometer

1. Ensure a system of recording field data is handy before going out into the paddock to take readings. Consider using a table format, or have some other easy method such as electronic PDA with spread sheet on hand.
2. Pushing straight down on the handles of the penetrometer (never push or pull at an angle for risk of damage to the penetrometer or injury to the operator are sustained), watch the dial indicator as the pressure increases to its maximum above 300psi. Note on the shaft of the penetrometer the depth at which this high figure occurs and record it along with the figure.

3. Continue pushing down on the penetrometer to find any other layers of compaction greater than 300psi and record at which depth they occur until you have reached the full length of the shaft. (800-900mm)
4. Locate other representative points in the paddock(s) and repeat the above 3 steps ensuring that detailed recording of all the data takes place.
5. The more samples that can be reasonably taken, the better the useful representative data collection. Note where plants grow better and check compaction in these areas compared to the less vegetated areas. Often manure pads and urine patches can be shown to be different to adjoining soils demonstrating that structural changes could come from biological breakdown of these materials occurring in reasonably healthy soils.

How to use this information is dependent upon the results found and the desired production expectations of the soils under question. The interpretation of the compaction data gathered requires many factors to be considered in conjunction with this information and, because of the large range of variables that are considered in association, is another study in itself.

In any case, you now have some very important raw data that helps create a benchmark from which you can help improve its True Fertility by bringing it back to life, health and optimum production - including increased water holding capacity (up to 70% more), raising organic matter levels and sequestering carbon to mitigate climate change.

Please contact this office for further details, including supply of equipment and advice on making the best use of this and other instruments, and some practices used for field data collection.

FOR FURTHER INFORMATION CONTACT

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