

What is a Healthy Soil?

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The discussion of “what is soil health?” often provokes emotive discussion. This is because soil health is a difficult concept to define and individuals have a differing concept of what soil health is, depending on the perspective of soil management. Soil health is promoted as being “*the land of milk and honey*” and being able to solve all the problems of modern agriculture. We take a more realistic view of soil health realising there are a lot of benefits from achieving a healthy soil, but with the knowledge that it may require some hard work to implement, requiring continual fine tuning and it may take some time to see the benefits. The definition we are using is for soil health is:

Soil health is the product or outcome of the functioning of the soil system for a given purpose.

In our case we are talking about the soils ability to function sustainably for the production of turf. We need the soil to support the profitable growth of plants without impacting on the surrounding environment and without degrading the soil resource. This involves balancing applied inputs to promote profitability and greater production against decreasing inputs to protect the environment.

Symptoms of unhealthy soils can vary from poor plant growth, poor water infiltration and soil erosion to continuing plant disease and pest problems and other issues. The symptoms not only show themselves on site, but may also show up as poor water quality leaving the site due to excess sediment and nutrients in water ways. This draws unfavourable attention from the public and environmental regulators, and puts pressure back on agricultural industries to improve management practices.

The concept of soil health needs to take a holistic view of the soil. That is, we need to look at the physical, chemical and biological components that make up a living soil, how they interact with one another and how they interact to sustain turf production (Figure 1). We have typically looked at the components of soils as separate categories with little regard to their interactions and dependence on one another. Land use and management decision have a big impact on the interaction of the components that go into making a healthy soil.

Components of a healthy soil

Physical soil properties deal with the arrangement of soil particles and the movement of air and water in and out of the soil. For good physical soil health we need air and water to be in constant supply to promote plant growth. If physical soil properties are lacking, we generally use tillage to improve air movement into the soil or irrigation to supply extra water. We vary rarely think about what effects these practices have on the chemical and biological properties in the soil.

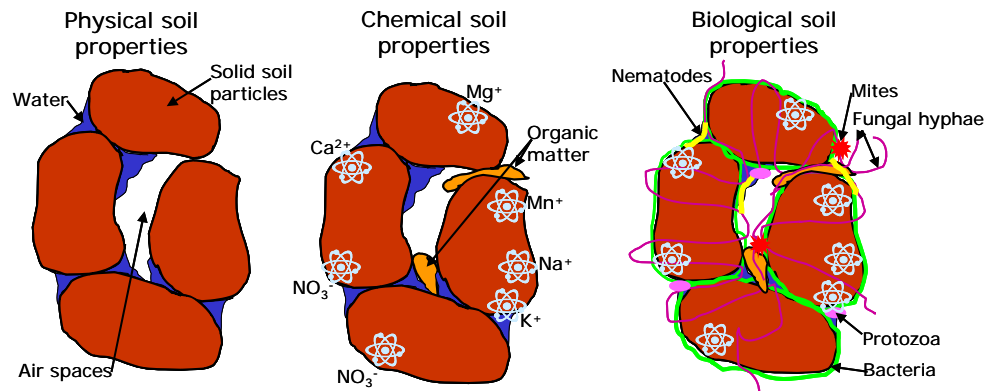


Figure 1: Physical, chemical and biological properties of soil interact to determine soil health.

Chemical soil properties deal with the nutrients in the soil and the soil's ability to supply nutrients to the plant. If we think chemical soil health is lacking we can add fertiliser to fix the nutrient deficiencies or amendment, such as lime, to correct a chemical imbalance. It is common place to add a bit more than is required just to make things grow slightly better. In doing so, we give little thought to what this is doing to the physical and biological properties of the soil.

Biological soil properties deal with the living component of the soil. We have traditionally been interested in the biological component of the soil when we get soil pests and disease problems. To overcome these problems we apply pesticides with little regard for the other organisms inhabiting the soil. Many of these organisms play a beneficial role in promoting plant growth by recycling nutrients, creating channels allowing movement of air and water, improving the structure of the soil and suppressing pests and diseases of plants.

Holistic soil management

Good soil health management takes a holistic view of how we can create a soil environment where the physical, chemical and biological components work together to sustain plant growth with minimal impact on the surrounding environment (Figure 2). By measuring soil properties and production indicators, it is possible to develop a set of key indicators for use in soil health monitoring. The indicators can take account of the physical, chemical and biological soil properties, their interaction with one another and their impact on production. This requires monitoring the soil environment and improved knowledge of how a soil functions and how our management decisions impact all the components of the soil. Ultimately, the land manager will be able to tell when a soil is healthy; by knowing what inputs are needed to grow the plants and how sustainable production is.

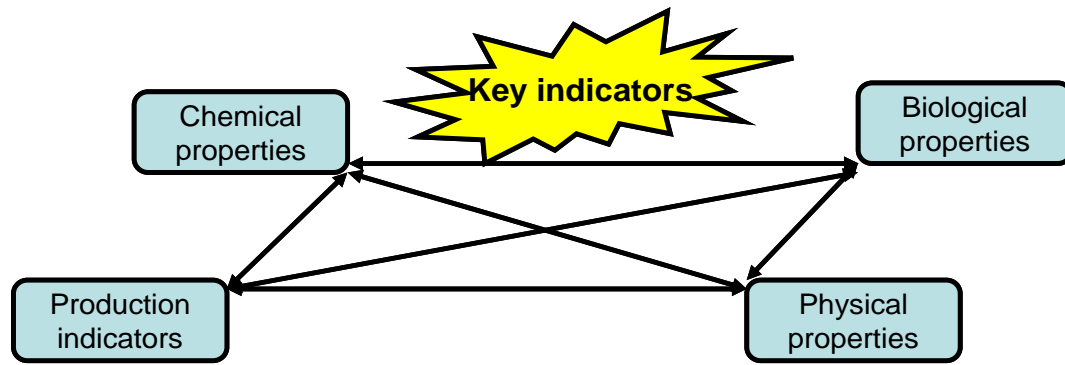


Figure 2: Holistic soil health management requires the monitoring of soil physical, chemical and biological properties and their interaction with one another and their impact on plant production.