The Soilsmart Newsletter

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Want to grow high quality, high energy, highly digestible, nutrient rich pasture, and at the same time build soil structure, increase soil moisture retention, remediate soil compaction and salinity, all while reducing input costs.

Sounds like a pipe dream doesn't it, but the truth is growers are already achieving these remarkable results, and it isn't complicated solution.

To grow healthy, productive, high quality, disease free plants you need healthy soil, but here's where a lot of people don't fully understand that the **soil is a living system**. Of course the physical structure of the soil is important, as is the balance of minerals (nutrients) present. But one of the most important components of healthy soil (the soil's biological properties) is often completely overlooked.

Truly healthy soil also comprises sufficient numbers and diversity of beneficial organisms (soil fungi, bacteria, nematodes, protozoa and so on) to maintain soil health.

In reality however, the vast majority of beneficial organisms in our soils have been gradually depleted over time with the rigors of normal soil management. What few organisms are left are often out-of-balance, adversely effecting soil structure, plant health, plant quality, and ultimately animal health.

Achieving the correct biological and chemical balance in the soil sounds like a difficult task, but it's actually relatively straight if you have access to the right technology.

Firstly we need to measure where you currently are, then add the right products to manage and manipulate soil biology toward the desired position.

Soilsmart, measure the quality and quantity of soil organisms and help you develop inexpensive and practical programs to build the life in your soil to grow healthier plants that achieve extraordinary results.

SO HOW DO YOU PROCEED?

1. Measure and test the current condition of the soil biology and chemistry.

2. Determine the soil biological balance required by the plants (fungal or bacterial dominance)? Soil biology assays let you know the amount and types of soil organisms present, as well as, what the desired ranges of these organisms are for the plants you are working with.

3. What is the current chemistry of the soil? Any dramatic imbalance or deficiency in soil chemistry should be addressed at the start of the program.

4. Soil testing will also determine soil organic matter to determine what additions are required to promote an appropriate environment for soil organisms to be grown.

CREATING THE RIGHT ENVIRONMENT

After we have the background information, the job is to provide biological inoculation, organic matter and the correct foods into your system to grow and restore the beneficial microbes needed in your system – **remembering that different crops have distinctly different needs in terms of soil biology**.

Pasture will grow best in a soil with a biological balance that is different to an orchard for instance, turf and vegetable crops require a completely different biological balance again. The different soil biology will also change the way the minerals are digested and made available, and they will also have differing effects on pH. The nitrogen released from the biological interactions in a fungal dominant system is released as ammonium, whereas the pH in the bacterial system favours the growth of nitrifying bacteria, which will convert nitrogen in the form of ammonium to nitrate.

So you can see that **SOIL BIOLOGY IS IN CHARGE**, we need to cut back a little on trying to manipulate the soil with chemicals and **GIVE THE MICROBES A CHANCE** to do their thing.

RESULTS!

Good, healthy and well structured soil will hold water against the flow of gravity within the structure created by the activity of soil microbes, organic matter and larger soil organisms such as earthworms. This is the same mechanism that works for trees in a natural forest system. Well structured, biologically active soils also resist waterlogging and pugging, keeping production levels and manageability up at all times.

Since the organisms are regulating the soil chemistry, the correct pH and form of plant available N are a standard by-product of the

correct soil biology being present, external disturbances notwithstanding.

Improving water retention and soil health are two major factors to reducing stress in pasture systems. Another great benefit from improved soil biology is that shed leaves and manure, (potentially harbouring pests and diseases) will be decomposed, not only providing organic matter to the soil, but also dramatically reducing pest and disease populations which may otherwise find refuge in the soil or on leaf surfaces.

Soilsmart have a range of biological inoculants (liquids & solids) that are prepared with the greatest diversity of organisms possible, be wary of products that have just a few species present.

WE ALSO NEED TO CONSIDER THE PHYSICAL CONDITION OF THE SOIL BEFORE APPLYING MICROBES.

1) **Well-structured?**

If there are lots of passageways to let air and microbes through, there is likely to be no problem with the organisms getting into the soil.

2) **Slightly compacted soil?**

The organisms will build the structure needed, as long as they have the needed foods to help them stay alive.

3) **Significantly compacted?**

A greater quantity and/or frequency of inoculation may be required. Food must be added, but must be added with care. Too much will drive the soil anaerobic as the organisms grow faster than oxygen can diffuse into the soil.

4) **Very compacted?**

We may have to open up the structure of the soil physically to allow the organisms to move into the soil. They may not be able to move into and survive in soil where there is a black layer.

A biological guide to drought recovery

There are many intervening processes that have a detrimental effect on soil biology, however in a truly natural system the effects of drought, flood and fire are short-lived, because the soil still contains sufficient numbers and diversity of beneficial organisms to enable it to recover quite quickly.

Our commercial production systems unfortunately don't recover as quickly because they have also had intervention by man. Applications of chemical fertilizers, mechanical cultivation (particularly destructive rotary hoeing), pesticide/fungicide use, and compaction from simply driving over the farm all take a toll on soil biology.

How does the drought actually affect the soil and its biomass.

As the soil dries, there is less moisture for extraction of nutrients by the plant. Soil life becomes dormant and the crucial biological interface between your crop and the soil is interrupted. Soil structure begins to collapse as the fungal "sponge" deteriorates. Less capillary soil water is available.

Leaf stomata close, vascular movement of water and the ability to translocate elements throughout the plant reduces. Photosynthesis slows, as does vital carbohydrate production. As the plant enters shock it will drop fruit and nuts, and older leaves will reach wilting point and eventually die.

More Sustainable Land Management

Maintenance of the soils' Organic Carbon (OC) and soil biology is key to minimising the effects of drought conditions and to mitigating moisture loss. Arid Zone farmers should prioritise this aspect of soil management.

OC is the primary source of energy for the soil ecosystem, and the major source and storage for plant nutrients. Not surprisingly it's the quality of OC which affects the diverse array of beneficial soil organisms, which rely on it for food and shelter.

High quality, biologically active products which have extremely high levels of biodiversity and stable OC, are required to provide adequate results, it's not simply a case of finding a cheap source of manure or aged organic matter.

An effective biological recovery program will have sufficient activity to initiate rapid soil structural improvement given small amounts of moisture. This activity can quickly rebuild fungal and bacterial populations and create billions of micro-pores in the soil to trap capillary water (the most available water supply in the soil, for plants to access). This structural improvement also helps to retain more of the gravitational water in the soil (that which moves quickly through the profile) and ends up, along with the nutrients it carries, in the sub soil and eventually the water table.

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