



## SOIL CONSTRAINTS AND TURF MANAGEMENT

Achieving healthy soil and turf requires a focus on the combination of biological processes, chemical interactions, and physical characteristics. These three factors depend on each other to work effectively, and any imbalances can eventually lead to the challenges we face daily such as disease, nutritional deficiencies, and poor drainage.

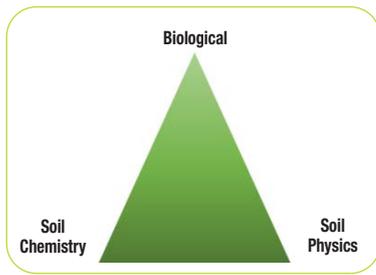


Fig 1.1 - Soil Management Pyramid

Physical soil characteristics depend on strong growing plants that will excrete exudates through the root system that in turn stimulates soil biology, speeds up nutrition cycles which creates healthy plants – the cycle continues.

An imbalance that is often misunderstood is the nutritional imbalance. When we get a soil test back from the lab, our focus is almost always on what is missing rather than what we have too much of. Plant nutrients have a complex relationship where an excess of one element can in fact inhibit the plant uptake of another. For example, excess nitrogen will cause reduced uptake of potassium (K), boron (B) and copper (Cu) - it induces a deficiency even if soil levels appear to be fine. How many times do we pour on nitrogen trying to achieve growth and see substandard results? The intended growth is inhibited by the induced deficiency of the other three elements.

Understanding these antagonistic relationships is just as important as understanding the synergistic ones. A simple tool for any turf manager is the Mulders chart which outlines the

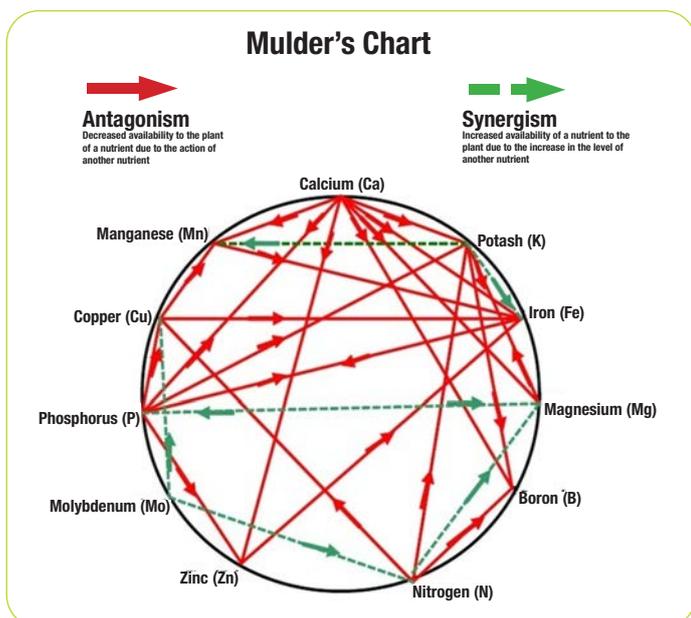


Fig 1.2 - Mulders Chart

highly complex relationships. It is the best pin-up a turf manager can have in their office!

Three of our products from the Nuturf FoliMAX® range address the need to control all three major soil processes, biological, physical and chemical; those are **FoliMAX MLR-8™**, **FoliMAX Soil Prima™** and **FoliMAX Bi-Pass™**. Each plays a function in its own right but when used together in a program, they present a genuinely significant solution to your soil troubles.

**FoliMAX MLR-8™** is a powerful tool for increasing plant available calcium along with soil structural calcium simultaneously. The product is a complex formulation of calcium and sugars, the key being highly soluble calcium which increases the amount of calcium at the targeted area. FoliMAX MLR-8™ contains more than 5 times the water-soluble calcium when compared to common alternatives such as gypsum and lime. This can be applied directly to the soil surface to be washed in or worked in. Refer to Fig 1.3

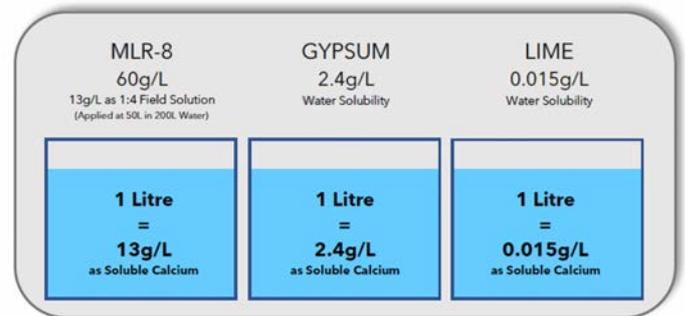


Fig 1.3 - Soluble calcium comparison

The addition of calcium displaces soil sodium, leading to an overall improvement in the proportion of desirable cations in the soil, decreasing sodicity and helping to stabilise soil pH. The calcium will locate on exchange sites and will improve oxygenation through better structure leading to less pooling of irrigation water and less anaerobic conditions under your turf, ensuring the root zone remains aerobic will assist in avoiding issues such as black layer. Applied calcium will move through the plant and into the new growth tips resulting in the plant releasing auxins which traverse to the root tips encouraging cell division and giving you more vigorous roots and a bigger root volume.

FoliMAX MLR-8™ contains complex sugars and organic acids that act as a food source for soil biology needed to continue processing organic matter. The organic compounds in FoliMAX MLR-8™ make other nutrients more bio available to plants and provide an energy source for soil biota, especially the fungi that are responsible for the stimulation of nitrifying bacteria which leads to increased utilisation of soil nitrogen. Several studies have shown a reduction in diseases like pythium, when similar sugar compounds are applied.



As you can see, you are doing more than simply adding calcium.

**FoliMAX Soil Prima™** is a modified potassium humate (patent protected process) that acts as a complexing agent to mobilise soil nutrients in forms that are readily plant available. FoliMAX Soil Prima™ provides a complex energy source (500 calories per gram) to accelerate microbial activity, in turn increasing organic matter breakdown and nutrient cycling. The recycling of thatch and mat creates a more friable soil layer, enabling water to drain more freely and aiding the flushing of sulphur build-ups – black layer again!

FoliMAX Soil Prima™ has a CEC of 900 so can easily increase the CEC of your soil, i.e., the ability of the soil to retain its nutrients, reducing the leaching of many water soluble nutrients increasing their utilisation and minimising waste or more importantly reducing runoff into local waterways.

Rather than just “adding more” as a way to fix an issue, the calcium in FoliMAX MLR-8™ can now preferentially locate on exchange sites shifting the soil chemical balance to a more favourable position. As soil microbes break down the thatch, and the humic component increases soil function, the availability of existing and applied nutrients and water increases.

**FoliMAX Bi-Pass™** is best used as a pre-emptive treatment of irrigation water. By adding FoliMAX Bi-Pass™ before your irrigation water hits the ground you make your water “soil ready”. While this is not always possible, treating the water before it touches your turf means there are a multitude of issues you may never have to face.

Many recycled irrigation water sources and calcareous (limestone) soils contain high levels of bicarbonate and carbonate, both of which can adversely impact plant growth by raising soil and water pH, increasing soil salinity, and affecting the availability and uptake of macro-nutrients and many critical micro-nutrients from the soil. Continued use of high bicarbonate water leads to a high soil pH. When Na (sodium) is the predominant cation in the soil, pH may be as high as 9.5. However, when calcium dominates, soil pH generally stabilizes around 8.0. High pH can induce nutrient deficiencies and inefficiencies such as iron and manganese deficiencies by rendering these micronutrients unavailable to the plant roots. High soil pH can also favour the development of root diseases, such as take-all. FoliMAX Bi-Pass™ counteracts excess bicarbonate and carbonate in recycled/effluent irrigation water, helping you manage soil pH.

The organic compounds in FoliMAX Bi-Pass™ which includes polyphenolic compounds and lignosulphonic acid offset the antagonistic effect of soil and water-based bicarbonate.



Fig 1.4 - Effect of the application of FoliMAX MLR-8™ and FoliMAX Soil Prima™ on black layer on a golf green

Carbonate and bicarbonate readily bind with calcium forming calcium carbonate ( $\text{CaCO}_3$ ) or calcium bicarbonate ( $\text{Ca HCO}_3$ ). By preventing the binding and maintaining availability you have increased calcium + magnesium in relation to sodium. This is seen in test results as decreasing the SAR (sodium absorption ratio). By managing this interaction at the water source, you have put yourself ahead of the soil interaction.

Key messages:

- Issues such as poor water filtration, poor turf recovery or vigour, poor rooting depth, thatch, acid throttle, high sodicity, and high salinity are rarely independent. Since they commonly co-exist, success in managing them requires a comprehensive approach that considers the chemical, physical and biological processes occurring in the soil environment.
- FoliMAX MLR-8™, FoliMAX Soil Prima™, and FoliMAX Bi-Pass™ from the Nuturf range concurrently address multiple soil health challenges by targeting all three major soil processes: biological, physical and chemical.
- By maximising the synergistic relationships and finding a balance between turf and environment, all your efforts can be focused on producing magnificent turf instead of resolving issues with corrective actions.

Speak to your Nuturf Territory manager today about how these products can become part of your management regime.

Content supplied by Burt Naude BSc (Soil Science), Business development and technical support - Wilchem.



For more information contact your local Nuturf Territory Manager on 1800 631 008 or visit [www.nuturf.com.au](http://www.nuturf.com.au)



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