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Sustainable soils

Fertility = nutrition + microbes + carbon

Accessing the Free Gift

An essential part of managing nitrogen for increased yield and crop quality is to ensure that a large part of your nitrogen requirements are sourced from the atmosphere, rather than a bag.

The most productive soils on the planet have produced massive amounts of biomass for thousands of years and most of their nitrogen was sourced from the atmosphere. 74,000 tonnes of atmospheric nitrogen hovers over every hectare and this is where we're supposed to get our nitrogen.

This was the free gift that we somehow forgot to open.

It is also in the form of nitrogen most closely linked to crop quality, disease protection, flavour and shelf-life. Nitrogen fixing microbes deliver the perfect form of nitrogen to enhance plant health and that nitrogen is supplied as and when it is required by the plant, rather than the common practice of force feeding.

It is no accident that the most abundant gas in the atmosphere is also the most abundant nutrient required for plant growth. It's there for each and every one of us, but how do we access the gift?

The Recipe for Free Nitrogen

The key to accessing atmospheric nitrogen involves seven factors:

1. Twin N™ Nitrogen Fixing Microbe Inoculum

Effective colonization is measured in 'Colony Forming Units' or CFU.

Two CFU per mm² of leaf surface or root surface early in the crop cycle is all that is required to inoculate endophytic and non- endophytic N fixing bacteria into and onto the plant. Below this critical threshold level, reliability of response dwindles.

To achieve this threshold level, the bacteria being applied must have consistent and high viability and contain a high concentration of the correct bacterial colonies



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2. Soil Carbon

Carbon and soil humus are the home base for soil microbes and offer sanctuary whilst CFU inoculations are being established and “linked up” with the final host plant. Inclusion of a carbon based additive (such as humates or kelp) to the crop and soil in low organic matter soils improves the survival and yield output of N fixing microbes.

3. The Calcium to Magnesium Ratio

must be acceptable. This ratio defines all beneficial soil-life activity because of its link to oxygen supply in the soil. However, it is particularly important in nitrogen fixation. A high magnesium soil struggles to breathe, like an animal nearing death. Improving the Ca:Mg Ratio (if necessary) is the first step in any biological program.

4. Soluble phosphate

must be present as an energy source for the enzymatic conversion of atmospheric nitrogen (NO_2) into the plant-available ammonium form (NH_4). Adenosine-tri-phosphate (ATP) is required for enzymatic reactions. In the natural scheme of things, soluble phosphate is supplied by mycorrhizal fungi. VAM exude acids from their massive pipe like network of hyphae which constantly solubilise phosphate from the ‘frozen’ reserves of insoluble tri-calcium phosphate in the soil. However, these are also the creatures most decimated by chemical agriculture, so we can no longer rely upon their contribution to the recipe. If your soil life has been compromised, then soluble phosphate will be necessary for the 7 part recipe.

5. Molybdenum

is one of two minerals that form part of the nitrogenase enzyme responsible for conversion of atmospheric nitrogen to ammonium nitrogen.

6. Iron

is the second mineral which forms part of the nitrogenase enzyme. Iron is the most abundant mineral in the universe but it is often termed “the reluctant mineral” because it is not always present in a soluble form. Humic acid has a tremendous affinity for iron. The simple and inexpensive addition of a few kilos of soluble humates per hectare should release enough iron for nitrogen fixation.

7. Cobalt

is the final ingredient in the recipe.

Cobalt is like mother’s milk to nitrogen-fixing organisms. Their health and productivity is strongly influenced by this trace mineral and yet it is seriously deficient in many of soils. Like molybdenum it is needed only in ppm.