



## Products & Advice for Regenerative Agriculture

# NITROGEN - highly Important... but need NOT be HIGHLY IMPORTED

**Depending solely on "Imported" water soluble Nitrogen fertilizer will always be a short term "feed your crop" solution...**

For many broadacre, horticulture and tree crop farmers the low productivity of our soils is accepted as normal. They believe that our soils have always been this way and always will. The soil is used as a simple media to hold up the plants, which are virtually grown hydroponically with highly soluble fertilizers. Some agronomists now provide total fertility programs for growing various crops which take no account whatsoever of inherent soil fertility.

### **Nitrogen Reserves in Soil...**

Research has shown that fertile soil can have Nitrogen reserves of as much as 5000 kilograms (5 tonne) per hectare, possibly higher where legumes have been grown. **This would be equivalent to almost 11 tonne per hectare of Urea.**

### **Available Nitrogen...**

One of the main things to be aware of is that Nitrate Nitrogen as measured in your soil test shows only the plant available form of Nitrogen. Nitrate Nitrogen, coupled with Ammonia and Nitrite Nitrogen, **accounts for less than 3% of the total Nitrogen in your soil.**

Total Nitrogen is not often performed on soil tests, but to give you one example, a recent soil test that I was looking at showed 10.4 mg / kg of Nitrate Nitrogen which is equal to 10.4 kg/ha/10 cm depth. The test for Total N indicated 6,213 ml/kg.

**This equates to 6.213 tonne of Nitrogen stored in the soil with less than 0.2% in the plant available form, Nitrate Nitrogen.**

When assessing a soil test, it is essential to recognize and evaluate the physical aspects such as soil structure and moisture holding capacity, previous cropping and fertilizer practices as well as evaluating the actual test results. This information can give an indication of the Biological activity in your soil and helps to give a better overall picture of soil fertility levels.

### **How can you utilize the Nitrogen Bank in your soil?**

The bulk of soil Nitrogen is held in an insoluble form and comes from decomposed organic matter. Humus provides a reservoir for mineral nutrients including Nitrogen, holding them in a way that does not allow them to disperse or precipitate.

Under favourable conditions, soil microbes convert this stored Nitrogen from ammonia to ammonium, and then to the nitrate Nitrogen form that can be readily used by plants. This entire process, referred to as **nitrification**, is very much dependant on the presence of appropriate soil organisms such as bacteria and fungi.

### **Depletion of Nitrogen reserves through leaching and denitrification...**

Once soil Nitrogen is converted into nitrate it is subject to leaching. In addition to loss by leaching, anaerobic microbes thrive in waterlogged or compacted soil where oxygen is lacking and convert nitrate into gases. This process of **denitrification** allows the Nitrogen to escape from the soil into the atmosphere.

Soil aeration not only helps to reduce this loss of Nitrogen, but also stimulates the microbial activity responsible for the rapid conversion of stored Nitrogen to plant available nitrate.

### **How to build Nitrogen reserves in your soil...**

Soil microbes are the key to increasing the humus levels in soil to provide a storehouse for nutrients. Soil microbes produce their own weight in humus every day and play an essential role in Nitrogen fixation.

Management decisions regarding mulching practices, soil remineralization, crop selection, crop rotation, cultivation, the type and amount of chemicals used and grazing practices can all have an impact.

If humus levels are low in the soil there will be increased leaching of nutrients, poor soil structure, reduced water holding capacity and very little nutrient storage resulting in crops that are highly dependant on artificial water soluble fertilizer.

### **Sources of Nitrogen...**

Natural sources of Nitrogen can be harnessed in addition to traditionally used water soluble Nitrogen fertilizer. These natural sources include legumes, air (78% Nitrogen), worm castings and animal manure.

### **Water soluble fertilizer - "Imported Nitrogen"**

There is no question as to the importance of Nitrogen, but it can prove to be a very costly exercise to depend entirely on Nitrogen in its synthetic forms such as urea and other blends.

**This costly experience is not only in \$\$ terms.** Applied Nitrogen fertilizer is often subject to high levels of **volatilization**, where Nitrogen is lost to the atmosphere as ammonia gas. This is most prevalent during light rainfall or heavy overnight dew when moisture levels are sufficient to dissolve the urea into ammonia gas, but are inadequate to wash the urea into the soil. It has been estimated that up to two thirds of applied Nitrogen can be lost in this way.

In addition to the potential loss of Nitrogen through volatilization and leaching, Nitrogen can have a number of detrimental effects on the soil

- Soluble salt, urea or ammonium accumulation can inhibit nitrification.

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Fertile soil can **INCREASE** your production and **SAVE** you money.  
Fax your soil test or phone us now for practical advice  
on how to regenerate fertility to your soil.

# Alternatives to Nitrogen Fertilizer...

## Imported Nitrogen... A costly experience (continued)

- Reduction of soil organisms (CSIRO research found that 80kg/ha of Nitrogen fertilizer can reduce soil microbe populations by 25%)
- Soil acidification
- Loss of Humus. For every 1 kg of excess Nitrogen applied, 100 kg of soil humus is destroyed (*The Carbon Cycle by Leonard Ridzon*).

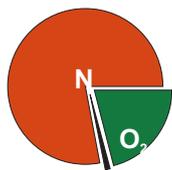
Anhydrous Ammonia has been found to be the most damaging form of N to soil life. Of course the amount of Nitrogen fertilizer used determines the level of damage.

Given that soil microbes are essential for humus formation and Nitrogen fixation, it seems unlikely that the application of high levels of Nitrogen fertilizer would be helpful in building Nitrogen reserves in your soil.

## What else can you use to build the Nitrogen bank in your soil?

It is important to follow a program that works with nature to restore soil reserves. A program of remineralization, crop rotation with a legume, mulching and soil aeration practices will help to increase the soil microbe population and in turn increase nitrification and humus formation, thus reducing the dependency on artificial N.

## 78,000 tonne of Nitrogen above every hectare...



The air around us and our soil consists of 78% Nitrogen, 21% Oxygen, with the other 1% made up of a mixture of gases.

Air provides an abundant source of Nitrogen that is often overlooked. Atmospheric Oxygen is also a necessity for aerobic soil microbes - the microbes that are essential for Nitrogen fixation.

Soil microbes play a unique role in harnessing atmospheric Nitrogen. It has been estimated that the quantity of N fixed in this way is approximately four times the amount fixed by the chemical industry annually. N fixation from the atmosphere occurs with both symbiotic microbes (Rhizobium microbes on legumes) and non-symbiotic microbial activity.

## Using Legumes to build Nitrogen reserves in your soil...

A well established legume crop can produce up to 200kg Nitrogen per Ha each year. In growing sugar cane, this has been shown to reduce the Nitrogen rates for plant cane by 50 - 60 kg/ha.

The following chart shows the annual fixation of Nitrogen by the different types of Legumes.

Legume	N fixed kg/ha	Legume	N fixed kg/ha
Lucerne	220	Vetch	90
Clover	115-200	Peas	80
Soybeans	110	Peanuts	50
Cowpeas	100	Beans	45

## What about manure?

Manure is very beneficial in small amounts. Not only does it provide a source of Nitrogen, it also contains high levels of micro organisms that are beneficial to stimulate the soil.

By using un-composted manure from feed lots or chicken houses you may unknowingly increase unwanted weeds, pathogens and salts in your soil. Some farmers who have used large quantities of manure have experienced a higher incidence of root disease and fungus problems in their crop.

Composted manure is the ideal as it has already undergone decomposition by microbe activity giving it a higher concentration of Nitrogen.

The type of manure also determines the amount of Nitrogen. For instance, Pig manure provides up to 1.2%, Cow Manure 1.4% and Fowl manure 2.6%.

## Soil Regeneration...

The future of agriculture is trending toward low chemical or organic farming practices. The first step to take is to identify and address soil fertility problems.

Before you plant your next crop, give us a call. We can advise you in relation to regenerative farming practices and tell you more about how the Natra Min range of products can help you to improve your soil fertility and reduce chemical fertilizer dependency.



## Minerals - essential for Animal Health & Production

We have had lots of positive feedback from farmers regarding the use of Superior Mineral Supplement for their animals.

### These results have included...

- **Dairy cattle:** Scouring problems associated with feeding ad lib molasses reduced after feeding Superior at 75 g / day.
- **Cattle:** Glossy and darker colour, less mucus, clearer whites in eyes and manure has less smell and breaks down quickly.
- **Conception Levels:** Since feeding Superior in daily rations, herd conception levels have improved dramatically. This is despite many unsuccessful attempts to improve fertility rates using other products over the past ten years.

- **Grain Feeding:** Despite using bi-carb soda acidosis problems persisted until Superior was introduced at 45 g / day.
- **Horses:** Persistent split hoof problem healed over a four month period and colour of coat went from a rusty brown to black.
- **Horses:** Improved stamina.
- **Goats:** Definite improvement in gloss and colour of coat. Finer class of mohair.
- **Cost Effective:** One farmer said... "for the results I'm getting and compared to other minerals I've used, you could charge twice the price."

Thank you to those farmers who have taken the time to let us know of your experiences as this can help other farmers to solve their problems. We appreciate your feedback.

Natra Min is now available in four different blends...

Natra Min      Natra Min HI-Phos  
 Natra Min K    Natra Min K-Phos  
 Fax over your soil test and we can evaluate which blend is suitable for your soil.      FAX 07 5482 7219



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For nutritional advice for your animals or to find out more about soil regeneration...

Give us a call on  
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