

4th February 2022

DoloZest® News

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The mycorrhizal effect

Mycorrhizal fungi occur naturally and from a farming perspective it is only brassicas that do not benefit from their ability to harvest extra moisture and nutrient.

Any deep-rooted pasture plant when removed from well-structured soil has metres of visible root, some of which are very fine.

Imagine if you will those roots extended several times over and the increase in tucker available for plant uptake as a result.

This is primarily the reason for pastures grown using Functional Fertiliser programmes to continue to stay green and grow strongly into a dry spell.

It also, in part, is the reason for the more rapid recovery of pasture plants when rain arrives after a dry spell.

The activity of mycorrhizae rely on a steady supply of energy in the form of soluble sugars to maintain their work and this is provided by plants efficiently photosynthesising.

Photosynthesis is the process by which plants utilise carbon dioxide (CO₂) water and sunlight to produce sugar, an activity that has been unable to be replicated in a laboratory.

Essential to the formation of soluble sugars, easily measured with a handheld refractometer, is phosphorus, the reason for phosphate being an integral part of pastoral fertiliser inputs.

New Zealand soils generally contain around 500kg/ha of naturally occurring phosphorus in the top 15cm, with considerably more below that depth.

Annual uptake for high performing pasture and crops is around 50kg/ha/year with close to 60% of that returned to the soil in the form of dung, litter, and dead roots.

The reason for more than maintenance inputs being recommended, particularly by those selling superphosphate, is largely due to the inability of plants to easily extract phosphorus from the soil.

Phosphorus, in soils containing large quantities of iron and manganese, is sufficiently tightly held for phosphorus deficiencies to occur limiting plant growth.

Clover plants are less competitive harvesters than grasses hence higher levels of plant available phosphorus are required to promote strong clover growth.

Historically the answer has been to apply higher than maintenance amounts in a water-soluble form, however work by CSIRO in Australia has shown that the activity of mycorrhizal fungi is reduced in these situations.

To maximise the ability of plants to access and utilise soil held phosphorus is to apply phosphorus using soft phosphate rock.

Water soluble phosphorus has the added disadvantage of running-off when applied just prior to significant rainfall.

Our understanding is that little phosphorus is lost via leaching however there is more work to be done in that space.

Soluble phosphorus does not remain immediately plant available for long periods after application. In as little as 72 hours after reaching the soil a high percentage will be bound with other minerals.

Uptake is then dependent on the activity of mycorrhizae along with a myriad of other beneficial soil dwellers for sufficient to be available for maximum plant growth.

CalciZest and DoloZest contain new and improved strains of mycorrhizae.

The days of cheap phosphorus in the form of locally made super may well be ending.

Suitable phosphorus

Internationally the supply of low cadmium phosphorus suitable for crop and pasture growth is becoming increasingly restricted.

There is a finite amount and countries with deposits are moving to ensure their own domestic markets are supplied before releasing it for others.



Prices will continue to increase particularly where coal is being used as the energy source for factories manufacturing soluble products.

This is one of the reasons given for the marked increase in fertiliser prices out of China.

By using phosphorus more efficiently through improving physical soil structures and stimulating fungal activity, the use of higher cadmium content rock becomes possible as it is the total amount of cadmium applied rather than the concentration.

Chatham Rise phosphorus

New Zealand has a large deposit of high-quality phosphorus available should those interested in mining it convince the Government that the value to agriculture outweighs environmental damage resulting from the extraction process.

A 2013 newspaper article states that the Chatham Rise deposit contains low levels of cadmium, and from work undertaken in the 1950's the deposit could exceed a harvestable 25 million tonnes, enough for 20 years or more of agricultural demand.

It has the added benefit of being sufficiently soft that it could be applied directly to pasture without acid treatment. It's a deposit that has formed over millions of years and, as with limestone harvesting and mining, applying to pasture can be viewed as a very long-term recycling process.

Glomalin

Glomalin is glycoprotein produced by mycorrhizae. It builds the tread resistant crumb essential for soil stability. Without ongoing glomalin supply soils lose structure and compact easily under the feet of animals or wheels of tractors.

The easiest way to test for adequate glomalin is to dig up a handful of topsoil scrunch it into a ball and note how quickly it can be broken back down to crumb. Soils for best performance contain 25% air and glomalin is essential to achieving and maintaining adequate levels.

A simple slake test that measures the speed at which water percolates through soil is another useful way of monitoring physical structures and there are numerous youtube clips demonstrating the process.

It's a fascinating activity to undertake on your own property and provides a real insight into soil stability. Excellent soil stability results in optimum performance of all plants and trees, and glomalin is the key.

Strong crumb structure encourages plant roots to delve deeply and extract the minerals and moisture necessary for optimum performance.

Poorly structured soils are characterised by short periods of exceptional growth followed by long periods of slow growth.

Increasingly large bare areas of soil, and plants growing with their crowns high are an obvious sign of soils with less than optimum crumb and oxygen content.

Sugar formation

First time FF customers often ask about the signs that the product is working. One of the first and most obvious is the grazing habit of animals. Stock entering a conventionally fertilised area often browse for a period looking for a patch of tastier feed.

After a CalciZest or DoloZest based mix is applied animals tend to graze rather than browse as the feed becomes uniformly palatable. As a result they also spend more time sitting ruminating and less time eating, a reason for more rapid growth.

A handheld refractometer is the best means of measuring soluble sugars, and useful regardless of what is being grown.

It takes time and many readings to get a real feel for the process however once mastered there's much useful information to be gained.

The level of soluble sugars in the leaf of plants is influenced by maturity and the amount of direct sunlight at the time of testing.

Time of day also plays a role. Pastures are typically highest between 3pm and 4pm.

Overnight brix levels drop as sugar translocates to the root feeding mycorrhizal fungi that then make tightly held nutrient and moisture available for plant uptake.

Phosphate rock supply

Oil prices are climbing and fertiliser prices are closely correlated to the cost of diesel and petrol.

We currently have suitable phosphate in store, however stock is limited and we expect future supplies to be more expensive.

Regards,

Paul
Carole

Interesting link to check-out:-
[Why modern food lost its nutrients \(bbc.com\)](http://www.bbc.com/news/health-2012-07)

