

The Superior difference



Superior does it “just right”

SUPERIOR is a specialist fertiliser company that provides high quality advice and products to South Island farmers and growers.

We work with family farms, individual farm owners, buying groups and large scale corporate farms in dairy, beef, sheep, deer, cropping, horticulture and viticulture to ensure they receive the best advice, product and services to realise the maximum potential of each customer’s growing environments.

THERE IS NO BETTER WAY OF APPLYING FERTILISER

SUPERIOR has created a simple system that works - our unique “Goldilocks Principle”.

Not too much!

Not too little!

Just right!

Too much and your soil won’t be able hold the excess, your on-farm and downstream environments will suffer, and why pay for any more fertiliser than you need? Too little and you’ll fall short of the potential production gains.

This principle aligns perfectly to Superior’s Values.

DISCOVER THE SUPERIOR DIFFERENCE

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Our Mission

TO SUPPORT FARMERS with personalised service and nutrient advice with affordable and sustainable solutions.

Our Vision

TO BE THE LEADING PROVIDER of on-farm advice, service and sustainable nutrients – economically, environmentally and ethically.

Our Values

TO FOLLOW A MORAL COMPASS that will guide our decision-making and behaviour.

- > Deliver on all promises we make to our customers
- > Be 100% accountable, delivering the right product in the right volumes at the right price
- > Consider the environment in every decision
- > Value others, recognising the role every person has to play in our success
- > Be honest and respect our community, customers and staff
- > Support our communities
- > Have a willingness to learn, investing in our personal and corporate development.

We walk the talk. You have our word on it.

Bradley Edwards, General Manager
Lawrence Alloo, Director



It all starts with healthy soils

AGRICULTURE AND THE WEATHER place tremendous pressures on the soil. That's why Superior promotes a total soil care package.

First, we get to understand the make-up and health of your soils, and the demands you are going to place on them - before we apply one ounce of fertiliser.

A regime of vigorous soil tests will be undertaken and the

results will provide the basis of a Superior Fertiliser Management Plan customised for your unique situation.

We then supply the right amount of guaranteed-quality fertiliser for application, monitoring the outcomes and annually updating the Plan if necessary.



Superior can help improve soil nutrition and tilth...

balance
element
levels

correct
pH levels

increase
humus/
organic
matter

improve
water and air
infiltration

measure
CEC and ASC

promote
worm
populations

promote
healthy
micro-
organisms

SUPERIOR Soil

...and that's good for both your business and the environment



increased
plant
production
and quality

reduced
fertiliser
run-off

higher
plant nutrition
values

increased
clover and
legume-based
pasture

improved soil
resilience, less
degradation

reduced
pests and
pathogens

improved
fertiliser
efficiency

We'll get to know your soils

SUPERIOR SOIL TESTS

A SUPERIOR SOIL TEST gives us vital information about the existing levels of elements (deficiencies and excesses), pH levels and holding capacity (Cation Exchange Capacity or CEC) of your soils.

Our tests compare each soil element against the ideal quantity and ratio for your crop and farm. The results will provide the basis of a Superior Fertiliser Management Plan customised for your unique situation.

Why do we only use our soil test?

Soil test results vary between laboratories due to different methods used and non-standardisation of protocols between laboratories. For example, the standardisation of a soil test method involves defining parameters such as the solution mixed with the soil, how much solution is used, how long you shake a sample, what control or reference soil is used to calibrate instruments and compare your soil with, and so on.

Our fertiliser recommendations use rules specific to our soil test and would have to be recalibrated if we were to use an alternative laboratory. Even after recalibration there is no guarantee the outcomes would be consistent.

Our soil, herbage and fertiliser testing partner is **Eurofins**, one of the largest independent testing companies in the world with 23,000 employees and 225 labs across 39 countries.



Visual Soil Assessment of soils at Speargrass Flat, Wakatipu



SUPERIOR Testing



CATION EXCHANGE CAPACITY TEST (CEC)

Before we apply any fertiliser we need to know how much fertiliser your soil can hold. Otherwise you could end up wasting money and cause complications by over-applying some nutrients.

The holding capacity of your soil is measured using the Cation Exchange Capacity (CEC) test - the bigger the capacity, the greater the CEC.

A soil with a CEC of 14 (for example) will hold twice the nutrients of a soil with a CEC of 7. Organic matter and the amount of clay will drive the holding capacity of the soil. If you 'burn out' your soil, you will lose its capacity to hold nutrients.

Once these soils have been 'filled up' with the right nutrients they will both perform well, even though the holding capacity of each is different. The contrast is that the soil with a CEC of 7 will need to be filled up more often than the CEC soil of 14.

This is why we don't treat every soil the same.

ANION STORAGE CAPACITY (ASC) TEST

This is the ability of a soil to hold on to the anions, phosphate and sulphur. It is a key characteristic of the soil and the measure is expressed between 0% and 100%.

Low is 0-40%, medium is 41-70% and high is 71-100%. A low ASC soil has the potential to leach P and S.

It is important to know your soil properties and better manage fertiliser application, i.e. type and volumes. This might mean applying soluble P and S fertilisers in small amounts more often. Or conversely, in areas of heavier rainfall and more leaching, apply less soluble P and S fertilisers which become slowly available over time.

VSA TEST

The VSA (Visual Soil Assessment) tool is used to visually assess soil quality, pasture and crop performance. The outcomes are recorded and used to monitor future performance.

ORGANIC MATTER (OM) TEST

The higher the OM levels, the more likely your soil will have a good structure, water and air infiltration, and moisture retention.

The OM is not directly measured. It is determined by a calculation from the Total Carbon (TC) value, $OM = TC \times 1.72$.

WHAT IS pH?

The pH of your soil is simply measuring the concentration of hydrogen ions (H+) present. The greater the concentration of hydrogen, the lower the pH or more acidic your soil is. A high pH indicates a more alkaline soil with less hydrogen. A pH of 7 indicates a neutral soil.

Superior uses both the Olsen and Bray phosphate (P-1) tests.

TRACE ELEMENTS (EDTA) TEST

EDTA extraction method is the most appropriate test to measure trace elements in New Zealand conditions.

It is highly recommended to confirm trace element levels through herbage analysis, especially where high or very low levels are determined. This gives more accurate information on what animals are consuming from the pasture and any deficient/toxic levels.

HERBAGE TEST

There are some situations where using both herbage and soil testing will provide a better overall picture of the farm nutrient status, resulting in a best-outcome fertiliser programme. Superior will undertake out-sourced herbage testing.

SOIL TEST RESULT

Test data by Eurofins NZ Laboratory Services Limited



Laboratory Ref No.

Client:

Address:

Client Phone:

P O Box 337, Mosgiel, New Zealand
Phone (03) 484 7721

Web: www.superior.net.nz
Email: info@superior.net.nz

Sample:	Run block The Track	Consultant:
Crop:	Swedes/Turnips	Contact Ph No:
Regime:	Conventional	Test Date

Sample Depth	7.5cm
C.E.C. (M.E.)	12 Medium
Anion Storage Capacity	50 Medium
Soil pH	5.30
Organic Matter %	8.50
Nitrogen (N) Kg/Ha	134.40

Base Saturation Percentage		Desired % for Excellence	Available %	Excess/(Deficit) %	Outcome
CALCIUM (Ca++)	(60-72%)	68.00%	33.00%	(35.00%)	Extremely Deficient
MAGNESIUM (Mg++)	(10-14%)	12.00%	10.00%	(2.00%)	Excellent
POTASSIUM (K+)	(2.5-7.5%)	6.50%	12.00%	5.50%	Extremely Excessive
SODIUM (Na+)	(0.5-2.5%)	1.50%	0.70%	(0.80%)	OK
OTHER BASES (Variable)		3.00%	7.30%		
HYDROGEN (H+)		10.50%	37.00%		
Total Base Saturation (TBS)		101.50%	100.00%		

Expressed as kgs/ha		Desired (Kg's/Ha)	Available (Kg's/Ha)	Excess/(Deficit)	Outcome
Calcium (Ca)		3,656	1,774	(1,882)	Extremely Deficient
Magnesium (Mg)		387	323	(65)	Excellent
Potassium (K)		681	1,258	577	Extremely Excessive
Sodium (Na)		93	43	(49)	OK

Phosphates Bray		Desired (Kg's/Ha)	Available (Kg's/Ha)	Excess/(Deficit)	Outcome
(P2O5)		836	62	(774)	Deficient
Olsen P Level	P	30-40	14		Low
Olsen P kg/ha	P	-	-	0	
Total Phosphorous	P	1,800-2,000	986		Low
Sulphate - S (SO ₄)		112	9	(103)	Very Deficient
Total Sulphur S		1,344	813	(531)	Low

Trace Elements		Desired (Kg's/Ha)	Available (Kg's/Ha)	Excess/(Deficit)	Outcome
Boron (B)		3.4	1.8	(1.6)	OK
Iron (Fe)		1892.8	1,892.8	0.0	Excellent
Manganese (Mn)		300.0	47.0	(253.0)	Extremely Deficient
Copper (Cu)		11.2	2.9	(8.3)	Deficient
Zinc (Zn)		13.4	5.2	(8.3)	Extremely Deficient
Cobalt (Co)		3.4	0.2	(3.1)	Deficient
Molybdenum (Mo)		3.4	0.9	(2.5)	Deficient

Values in brackets denote deficiencies.



pl^{an} SUPERIOR

SUPERIOR PROMOTES the use of a Fertiliser Management Plan. This provides the blueprint for ongoing annual fertiliser planning.

Why should you do your annual planning?

- > Lets you be proactive at planning, versus reacting at the last minute;
- > Eliminates guesswork;
- > By soil testing in autumn you can plan your lime applications and get valuable advice for your crop and pasture selection;
- > Saves you valuable time so you can get on with the rest of your business;
- > Helps you communicate with your on-farm team, letting them know what's happening throughout the year;
- > It also helps us plan our purchasing for the next year, helping us negotiate better pricing for your business.

Custom-blended fertilisers

SUPERIOR SPECIALISES in producing carefully balanced custom blends of solid fertilisers and essential trace elements.

Each blend ensures that all vital elements are present in the soil in the correct minimum amounts and proportions, an essential foundation for the crops you intend to cultivate and the health of your livestock.

In addition to producing specialised custom blending, Superior recognises that there are some situations where a **stock product** is perfect for the job. That's why Superior has developed a product range for all situations to be used as starter fertilisers, post-harvest cuts and for spring and autumn applications.

All product is 100% quality guaranteed.

Our products comply with or exceed the heavy metal standards set by the New Zealand Fertiliser Association. We undertake quality testing through Eurofins New Zealand.

The majority of fertiliser sold in New Zealand is imported from around the globe. Superior recognises the importance of controlling quality and selling cost-effective fertiliser. This is why Superior has an office in Hong Kong where our International Procurement Manager is based.

Superior sources product from New Zealand, China, Oman, Laos, Egypt and Turkey.

Organic mixes with BioGro (5288) and Asure Quality (0796) certification are also available.

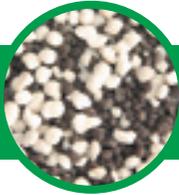




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SUPERIOR

SUPERIOR'S PRE-BLENDED STOCK PRODUCTS



SUPERIOR 20
N 20.3 | P 10 | S 12.5

Superior 20

Superior has specially developed Superior 20 to provide you with a higher ratio of N to P, and essential S where K is not required. Superior 20 is suitable for drilling field crops, cropping, broadcasting greenfeed brassicas and for sheep, beef and dairy pastures.



SUPERIOR BOOST
N 14 | P 12 | K 12 | S 4.7

Superior Boost

Superior Boost provides the key nutrients N, P, K, S (nitrogen, phosphorus, potassium and sulphur). It can be used in a range of situations – for boosting pasture growth after silage removal, starter fertiliser, crop establishment and a general pasture application.



SUPERIOR NKS
N 24.3 | K 20 | S 3.1

Superior NKS

Superior NKS is a ready-to-use blend that will provide you with a good balance of N, K and S. Designed specifically for fodder beet, it can be used for first and second N and K applications.



SUPERIOR UREA AS-K
N 38.6 | K 2.5 | S 4.7

Superior AS-K

Superior AS-K is a ready-to-use urea-based blend to provide you with a high N content and additional K and S. It can be used for most crops, including as a second or late N application to brassicas (applied with caution due to sulphur content – consult your Superior Fertiliser Advisor).



SUPERIOR AMMO 31
N 31 | S 14.4

Superior Ammo 31

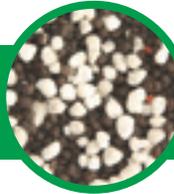
Superior Ammo 31 is a blend of nitrogen and sulphur that can be used in autumn, late winter or early spring applications to boost pasture production by supplying an available source of nitrogen and sulphur.



SUPERIOR AMMO 26
N 26 | S 19

Superior Ammo 26

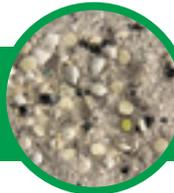
Superior Ammo 26 is a blend of nitrogen and sulphur that can be used in autumn, late winter or early spring applications to boost pasture production by supplying an available source of nitrogen and sulphur.



SUPERIOR MAP+S
N 17.6 | P 15.6 | S 5.7

Superior MAP+S

Superior MAP+S is a special blend to provide you with all the benefits of DAP, plus extra sulphur. It is suitable for drilling for field crops, greenfeed brassicas, and sheep, beef and dairy pasture. Superior MAP+S has excellent spreading qualities and flows well. It is also available with added boron (if drilling with boron, seed should not come into contact with fertiliser).



SUPERIOR HILL MIX
P 3.2 | S 6.5 PLUS TRACE

Superior Hill Mix

Trying to correct soil fertility in hill blocks to an optimum range is simply not practical from a logistical and cost perspective. Superior Hill Mix is the answer. It provides a cost effective broad spectrum fertiliser for stock health and pasture quality. An optional extra is Bentonite Sulphur prills.

Percentages of active ingredients:

Phosphorous	3.2	Magnesium	1.0
Sulphur	6.5	Boron	0.1
Calcium	27.3	Zinc	0.1

Superior's products are available in bulk and bags (1000kg, 500kg and 25kg).



SUPERIOR'S OTHER PRODUCTS

Ammonium Sulphate

Urea

Potassium Chloride

Sulphur Prills

Kieserite

Triple Super

MAP

RPR (Reactive Phosphate Rock)

Guano Phosphate

Magnesium Oxide/Chloride

Limestone

Salt

Trace elements:

Boron/Ulexite

Cobalt

Copper Sulphate

Manganese

Molybdenum

Selenium

Zinc Sulphate

Ferus Sulphate

Others

All technical advice is given in good faith but without warranty. The application and use of these products is beyond our control and we therefore do not warrant pasture, plant or crop performance to any specific level. In making our recommendations we rely on information provided to us by the customer and/or third parties such as soil testing through a laboratory. Environmental conditions which can impact on performance are also outside of our control. As an animal health precaution, it is recommended that stock be withheld from grazing treated areas until the fertiliser has disappeared from the foliage.

Application rates will vary depending on use and existing levels of minerals present in the soil, pH level and holding capacity (CEC) of your soil as determined by a Superior Soil Test.

Before mixing any fertiliser products please consult your local Superior Fertiliser Advisor for mixing specifications, limitations and potential hazards.

Superior solid fertilisers are available in bulk, and in 1 tonne, half tonne and 25kg bags ex-Superior, or at selected depots around the South Island.

For more information on Superior talk to your local Superior Fertiliser Advisor.

WHY IS SOIL FERTILITY IMPORTANT?

A FERTILE SOIL is the foundation for maximum agricultural productivity - supplying essential minerals for soil microbes and crops which, in turn, provide nutrition for people and animals.

Livestock productivity declines if their feed is deficient in any essential body constituent. Stock requirements for carbohydrates and fats (mainly used as sources of energy) are easily met, but the essential building blocks of proteins (i.e. the 8-10 essential amino acids required) are not so easily catered for because these amino acids are not interchangeable. Since proteins are required for growth, reproduction and providing immunity against disease, their absence in stock food can cause serious animal health issues and compromise productivity.

To produce mineral-rich, protein-rich, high fertility crops the constant goal of gaining higher yields by planting exotic pasture species and using predominantly N-P-K fertiliser to stimulate growth has caused overall soil fertility to decline. The outcome of focusing only on the bulk or dry weight produced is likely to be a depleted soil and the growing of bulk crops high in carbohydrates, but poor in minerals and protein, i.e. quantity rather than quality.

To produce mineral-rich, protein-rich, high fertility crops such as lucerne, clover and ryegrass requires mineral-rich soils. These crops represent better nutrition and lead to enhanced productivity. More nutritious crops give more grazing days per paddock with quicker and greater weight gains and a decline in the requirement for mineral feed supplements. Growing legumes that are able to fix nitrogen will also reduce the need for commercial nitrogen fertilisers.

Increasing pasture quality through growth on high fertility soils improves survival rates of newborn stock, produces better lambing and calving percentages, increases milk and fibre quality, and improves overall animal health. By growing crops in optimum soil conditions plants are also better able to develop their own resistance to pests, disease and drought.





SUPERIOR trace elements

TRACE ELEMENTS are also essential for vital biochemical functions in soil microbes, plants and animals. At least 16 of the 115 known elements found in the soil are essential for healthy plant growth, yet mainstream fertiliser programmes tend to focus on the ‘shotgun’ application of NPKS.

It is sometimes assumed that when all the major nutrients are present in the soil in the proper amounts, this makes the trace elements more available. However, this is only true when all trace elements are present in the soil initially.

Many soils can have a trace element deficiency which is harming the crop in some way, but is not yet a visible problem. This deficiency is often

magnified in livestock, causing animal health to suffer. Once symptoms of these hidden deficiencies show up it is often too late to reverse the problem

Reproductive irregularities or failure, and increased infections are often the first symptoms of nutritional deficiencies in animals. Often these can be linked to deficiencies in the soil.



Phosphorous (P)



In plants:

- The 'reluctant nutrient' as it gets attracted to Ca and becomes locked up.
- An energy provider vital for photosynthesis, cell division and growth, respiration and energy storage.
- An 'usher' of nutrients into the plant.
- Phosphorous will be suppressed by high zinc, and vice versa.



In animals:

- Component of catalysts which enable biochemical reactions of carbohydrate and proteins; so any P deficiency has serious implications.
- P (along with Ca and Mg) is important for 'hidden' processes within the body - in bones, teeth and the soft tissues.
- Phosphate can be mobilised from bone reserves when P is deficient in the diet and this can mask any deficiencies in animals. Problems with crop growth may be the earliest indicator of a P deficiency.
- Lack of P can cause fragile bones, decreased milk production and reduced egg production in poultry.
- Is a component of RNA and DNA, so is required for protein synthesis.
- Important for energy metabolism.
- Has a role in the absorption of fats and sugars from the intestine and in the release of glycogen from muscles.
- Phosphorous is a component of cell membranes.



Potassium (K)



In plants:

- Essential mineral for plants:
 - activates some enzymes involved with photosynthesis and protein synthesis;
 - is required in high quantities.
- Transport and storage of carbohydrates, getting reserves into plant roots, aiding winter hardiness, cell development, cell wall construction and cell wall strength.
- Improves stalk strength and crop bulk.
- Increases protein concentrations and other nutrients in forage.
- Key nutrient that improves water efficiency increasing crop quality and reducing disease.
- Potassium deficiency in plants will show up in the oldest leaves first; the leaf dies from the outside edge and proceeds towards the leaf centre.



In animals:

- Regulates water pressure, pH, and the nerve and muscle activity in the body. Needed for carbohydrate metabolism and for microbiological activity in the rumen.
- Lack of K causes loss of appetite, slow growth, poor hair and skin condition, decreased feed efficiency and cardiac impairment.



Sulphur (S)



In plants:

- Essential for protein, chlorophyll and seed production, and to fabricate enzymes and vitamins.
- Improves palatability (sweetness and taste), yield and keeping qualities.
- Important for early root development.
- Proteins in lucerne require (in order of importance) calcium, sulphur and phosphorous.
- Leaches easily, so repeated applications are required.
- If Ca, Mg, N, P and K are all present in the right amounts then will get a good response when correct S.
The major source of S is humus or organic matter so the more organic matter present, the less dependent you'll be on sulphur applications. This is why it is so important not to burn out your organic matter by applying excess nitrogen.



In animals:

- The sulphur containing amino acids (methionine and cystine) are essential building blocks of protein.
- Required for cell division and growth, the immune system and reproduction.
- The sulphate forms of many elements are more effective at preventing animal and human health problems than the chloride or nitrate forms.



Boron (B)



In plants:

- Increases nitrogen availability to plants.
- Assists with cell division, plant pollination, fruit set and seed development – carries the starch from leaf to the grain or fruit.
- Assists nodulation (for nitrogen fixation) in legumes, e.g. clover and lucerne.
- Crops require a continuous supply of boron – several applications through the season are ideal.
- Essential for lucerne crops.



In animals:

- In young animals boron deficiency can cause the blood supply to the growth plate of the bone to be interrupted, leading to localised bone cell death.



Calcium (Ca)



In plants:

- Cell division/elongation, i.e. growth.
- Increases disease and parasite resistance.
- Moves other nutrients into the plant root.
- When calcium levels are corrected, three times more phosphorus is moved into the plant.
- Ensures efficient use of nitrogen thereby increasing the protein in the plant.
- Regulation of acids and bases in the cell, and potassium and sodium in cell membranes.
- In the soil, calcium will open up the soil and cause the clay particles to flocculate and create space; hence it's commonly referred to as a 'soil conditioner'.



In animals:

- Increased calcium and phosphate in the soil improves protein levels in feed, leading to increased bodyweights and better reproductive outputs.
- Required for all processes involving protein.
- Creates bone and wool strength.
- Bones act as a calcium reservoir for the body with Ca moving in and out of the bone as required, e.g. for milk production.
- Low calcium can lead to milk fever.
- Ca, P and H combined act as buffers maintaining the correct pH and protecting the body against sudden changes in acidity.



Cobalt (Co)



In plants:

- A well known deficiency in New Zealand soils.
- A constituent of vitamin B-12, essential for hemoglobin formation and preventing the degeneration of nerves.
- Cobalt and iron are essential for:
 - legume nodule formation and nitrogen fixation;
 - seeds planted without cobalt and iron will not grow into a viable plant.
- Cobalt is needed by microorganisms, including rhizobium, the nitrogen-fixing bacteria associated with legume plants.



In animals:

- Lack of cobalt and copper can cause loss of appetite, emaciation, scaly skin, rough hair coat, listlessness and lack of thrift.



Copper (Cu)



In plants:

- Copper in plants is important for:
 - chlorophyll production;
 - seed development;
 - increased sugar content in fruits and vegetables;
 - contributes to produce colour and flavour, plus storage and shipping qualities.
- Along with potassium and magnesium, assists with stalk strength.
- Assists with nitrogen metabolism.
- Nitrogen overuse leads to copper deficiency shown by:
 - stunted growth
 - wilting
 - death of leaf tips.
- Excess phosphorous also ties up copper.
- Cu is an expensive element, but builds well in the soil.



In animals:

- Associated with biochemical processes of proteins, so is important for milk and wool production, bone development and for reproduction.
- Lack of copper can cause a reduction in wool strength. The wool loses its crimp and takes on a 'steely' appearance.
- Black sheep need copper to create black (not grey) wool.
- Where there is adequate calcium and phosphate but a lack of copper, the process of laying calcium in the bone structure can be interrupted leading to softened bone and possible bone fractures.

- Copper and manganese deficiencies can lead to sterility.
- Adequate dietary copper can help animals build resistance to intestinal parasitic worms; copper will loosen their attachment to the intestine walls causing them to be expelled from the body.
- Plays a major role in liver function, synthesis of haemoglobin and in the body's defence against microbes. It also prevents the degeneration of the spinal cord.



Iron (Fe)



In plants:

- Essential in the synthesis of chlorophyll so Fe is necessary for photosynthesis.
- Required for nitrogen fixation.
- Lack of iron will show up via yellowing of leaves and stunted plant growth with leaf tip die-back. When yellow leaves are cut off the new ones grown will be yellow.
- Excess iron isn't a problem in terms of production. However, iron level should always be greater than the level of manganese in the soil.



In animals:

- An important part of the haemoglobin molecule - it prevents anaemia.



Magnesium (Mg)



In plants:

- Is the central atom of chlorophyll; makes plants green.
- Essential to a plant's very existence due to its major role in photosynthesis.
- Enhances enzyme activity and facilitates biochemical reactions.
- Together with calcium, forms the glue that holds cell walls together.
- Pulls soil particles together. Excess Mg will make soil sticky when wet and hard when dry.
- Aids in metabolism of phosphorus (P).
- Yellowing pastures are not always caused by a lack of nitrogen, but may be due to not enough or too much magnesium in the soil affecting chlorophyll and interrupting photosynthesis. Magnesium acts as a coenzyme for nitrogen regulation, so a magnesium deficiency will interrupt the transfer of N into the plant and more nitrogen will be required.



In animals:

- Although Mg only makes up 0.05% of the animal body, it is an essential component of catalysts which enable biochemical reactions such as the metabolism of calcium and phosphorus.
- Shortage of Mg can lead to protein deficiencies affecting growth, the immune system and reproduction.
- Essential for bones and teeth, in the nervous system and as buffers to maintain the correct body pH.
- Inadequate digestion of Mg from the digestive system is the cause of grass staggers, nervousness, restlessness and loss of appetite.



Manganese (Mn)



In plants:

- Accelerates germination, fruiting and ripening of crops.
- Has major roles in chlorophyll synthesis, enzyme system construction and operation, and in photosynthesis.
- Vital for seed quality, yield and vitality.
- Along with potassium and copper leads to greater stalk strength.
- Involved in uptake of iron, carotene, ascorbic acid and glutathione in plants.
- When a plant is under stress it produces more glutathione which, in turn, attracts insects who eat the plants to obtain the glutathione.
- As the soil pH increases, the availability of manganese decreases. The level of manganese in soil should always be less than the iron present.
- Optimal soil level of manganese is still being debated, but an excellent level is around 250kg/ha. Research in Germany has shown levels as high as 500kg/ha can lead to very high yielding crops; but only when your base saturation levels of Ca, Mg, K and Na are balanced.



In animals:

- Lack of manganese can cause bone distortion disease, e.g. calves born with crooked necks and legs.
- Is part of many enzyme systems so is necessary for growth, bone structure and reproduction.
- Mn deficiency can cause reproductive defects in cattle, often causing abortions.



Molybdenum (Mo)



In plants:

- Vital for nitrogen fixing bacteria in legumes.
- Below 2 kg/ha molybdenum will become a limiting factor.
- However, too much molybdenum can cause toxicity; we only recommend application levels below 4 kg/ha.



In animals:

- Aids digestion giving more rapid growth.
- Excess Mo binds Cu in the intestine and causes scouring disease.



Selenium (Se)



In plants:

- Se is essential for livestock and humans, but is not necessary for plants.



In animals:

- Many New Zealand soils are Se deficient.
- Lack of Se and vitamin E causes white muscle disease with symptoms ranging from mild stiffness to sudden death; infertility in ewes; and ill-thrift in sheep and cattle.
- Yet excessive selenium can be extremely toxic in

animals and humans – care must be taken with any form of selenium treatment.

- Topdressing with selenium-containing prills at a rate of as little as 10g Se/ha-1 can be a safe and effective way of overcoming selenium deficiency for a period of up to one year.
- Soil acidity results in decreased Se availability to crops. Brassicas and legumes contain higher Se than other crops.



Sodium (Na)



In plants:

- Can have a marked effect on pH.
- Regulates osmotic pressure (the water pressure) in cell tissues and fluids.
- If the level of sodium is higher than the level of potassium, it can be mistaken by the plant for potassium and be taken up, causing cell rupture and death when conditions are hot or humid.



In animals:

- Helps maintain osmotic pressure in body cells.
- Important in manufacture of bile to digest fats and carbohydrates.



Zinc (Zn)



In plants:

- A growth regulator.
- Increases water absorption.
- Regulates plant sugar usage. Helps convert simple carbohydrates to complex forms.
- An enzyme activator and necessary for protein synthesis.
- Excess nitrogen, calcium and phosphorous can lead to zinc deficiency.
- Like copper, is held well in the soil once levels built-up.



In animals:

- Zn is essential in skin, hair and bone development.

THE ROLE OF MICROBIOLOGY

FOR A FARMING OPERATION, the soil structure and soil chemistry are only two-thirds of the equation. To maximise farm productivity you need a dynamic system in which the soil microbiology – the real ‘engine-room’ of the farm – is working for you.

Your fertiliser programme is the key to creating the ideal environment for the soil biota. Correcting the balance of calcium and magnesium is the key to creating the ideal soil porosity. While magnesium can pull a sandy soil together, calcium can condition a tightly held water-logged clay soil, opening up the soil and creating more air space.

Earthworms play a major part in aerating and conditioning the soil, shredding and decomposing plant matter with digested soil (in worm casts) containing higher amounts of plant-available N, P, K, Mg, Ca and Mo than the undigested soil. Earthworms also have a role in nitrogen fixation

Soil bacteria and fungi, in particular the mycorrhizal fungi that live in close association with plant root hairs, are largely responsible for the release of nutrients from soil and for breaking down fertilisers, making them into plant-available forms. Mycorrhizal fungi is especially important for releasing nutrients such as phosphorus which otherwise stay locked up in the soil.

Soil microbes also contribute to the soil structure and water-holding capacity of the soil and produce plant growth hormones and compounds that stimulate root growth and protect the plant from pathogens.

By taking care of the soil – correcting the soil chemistry to influence the soil structure and pH, and avoiding overuse of nitrogen fertiliser – you harvest all the benefits of a thriving soil microbiota.

THE RESULTS SPEAK FOR THEMSELVES

FARMERS using Superior fertiliser tell us that stock shows preference for crops grown on higher fertility soils by grazing the paddocks more evenly and favouring the paddocks with increased fertility.





The soil has come alive with lots of microbial activity, the worms are back and you can just tell by smell and feel that it is in better condition. Superior is now fundamental to our farm's profitability."

CUSTOMER, ST ANDREWS

We like the soil testing methodology Superior uses and the recommendations which come out of it. The company understands our business and it takes a holistic approach to help us achieve the quality we are looking for."

CUSTOMER, BANNOCKBURN VINEYARD

After 18 months it was very obvious the Superior paddock had a lot more clover cover than the other two and that paddock held on a lot longer in the dry. The ground also felt spongier under foot and manure was breaking down faster. You could also see the stock preferred the Superior paddock."

CUSTOMER, IDA VALLEY



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OVERSEER NUTRIENT MANAGEMENT BUDGETS

Overseer is an agricultural management tool which assists farmers in examining nutrient use and movement within a farm. The core of the model is a nutrient budget.

Our team members are qualified with Intermediate Sustainable Nutrient Management in New Zealand Agriculture accreditation. We will help you through the steps of Overseer, supported by a leading independent environmental consultancy firm to complete the budgets.

Hands-on support



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SUPERIOR **People**

SUPERIOR has a highly skilled team totally committed to helping you develop healthier, more productive soils and plants.

The team includes a full-time Technical Consultant who supports our Fertiliser Advisors on the farm and in the office.

Transport logistics are coordinated via our head office.

OUR PEOPLE will go the extra mile to deliver the full range of soil fertility services:

- > On-farm assessments, including soil and herbage testing
- > Fertiliser planning and recommendations
- > Supply of custom-blend and stock fertilisers
- > Subsequent monitoring of crops and pastures
- > Annual Fertiliser Management Plans.

Give us a call. We have a lot of customers who would be happy to share their Superior stories with you.





SUPERIOR

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