

PRODUCT GUIDE

# AGRICULTURE & HORTICULTURE









# our business is growing

“Fertilisers are concentrated sources of nutrients of natural or synthetic origin. They are applied to soil or to plant tissues in a convenient form such as pellets, granules, powders or liquids. Growth and the natural fertility of the soil is improved along with replenishment of the nutrients taken from the soil by previous growth”



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Copies of which are available on request. E & OE. January 2021.

Indigrow are specialist manufacturers of fertilisers and nutrients for the agriculture and horticulture markets, with over 75 years' experience of operating around the world. Covering 5 continents and over 40 countries, we employ over 35 staff with qualifications covering all the aspects of agronomy required to promote healthy growth. These include: PhD in Plant Science, MSc Agriculture, Soil and Plant Science, MSc Agrifood, MSc Industrial and Commercial Biotechnology, BSc (Hons) Horticultural Science, BSc Agriculture, BSc Agribusiness, BSc Sports Turf Science and H.N.D. Horticulture. We also have FACTS Qualified Advisers, BASIS Qualified Advisors, FACTS & BASIS Examiners.

**We would like to introduce you to our latest catalogue featuring full-page in-depth analysis of different types of products we manufacture. These include bio-stimulants, foliar and soluble fertilisers, water management products and a variety of the very latest innovative and technical products to promote a healthier crop, no matter the conditions faced around the globe.**

Buying the correct product can be confusing, and we are here to help. Simply email our specialist agricultural division and we will put you in direct contact with a regional technical manager to assist you with your requirements. Email [aghort@indigrow.com](mailto:aghort@indigrow.com) to get in touch or contact us on +44 (0) 1189 710 995.



*In addition to our dedicated agriculture and horticulture division we also have a specialist sportsturf division providing nutrition and custom solutions for managed amenity turf. For further details and advice, please contact us directly on [npk@indigrow.com](mailto:npk@indigrow.com) and we will put you in contact with your country's regional technical manager.*

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# growing with us

“Indigrow have over 40 years of experience in fertiliser and irrigation products for the agriculture sector. The current product range has been developed and improved over time to suit the plant requirements of a large number of fruits, vegetables and other crops whilst helping growers solve a wide range of common agricultural issues”



The Indigrow group of companies and our distributors maintain our product coverage throughout Europe, the Middle East, Asia and South America.

Indigrow has an extensive range of innovative products combined with our technical expertise ensures new product development from inception to market launch and provides recommendations to suit all climatic conditions and crop types.







## Research & Development

The Indigrow technical team works alongside a broad range of research and development institutes and academic facilities in the UK and globally to ensure Indigrow are tuned into the key issues facing farmers and growers in regards to crop production and quality.

This enables Indigrow to achieve its long term aims of satisfying growers requirements due to increased global food demand whilst minimising the potential impact on a fragile environment.

Unfortunately it is impossible to have perfect soils and weather across global agriculture and yet every continent has the same demands. Sometimes we have to mimic the best that nature provides to recreate these soils and help manage our limited water supplies more efficiently.

To that end Indigrow have identified key elements that nature provides within healthy soils to enhance nutrient and water use by the crop. These natural sustainable bio-stimulants have been formulated to work alongside conventional fertilisers to maximise crop production and quality.

Indigrow have a programme of development focused on bio-stimulants to enhance nutrient and water use efficiency as a more holistic approach to overall crop nutrition and soil health. Indigrow are investing in research to maximise crop production by utilising these natural sustainable alternatives in conjunction with conventional nutrition to increase crop production efficiency and quality to reduce crop waste.







## Manufacturing

Our manufacturing is carried out at a number of locations all of which are approved to ISO standards or equivalent and this backed up with modern distribution centres and logistics systems, used to handling and delivering quality products, safely.

At every stage in the production process attention to detail is key and maintaining quality and efficiency have been the main drivers of production. Provenance of raw materials and relationships with key suppliers ensures a consistency of both raw material supply and quality all inward batches are tested in our in-house laboratory and samples of finished goods are retained for reference.

We are able to produce aqueous based liquids, flowable liquids and soluble powders and surfactant based water management products in a variety of batch sizes and packaging. Granular materials require a larger minimum order quantity.







## Distribution

Once produced, our products are all stored at our UK warehouse until they are required. Our warehouse holds all the necessary certification to store products safely.

Our integrated links with the major transport industry hubs ensures that our products reach our customers in a timely fashion and in perfect condition.

## Our Offices

The Head Office is based on Berkshire, England. From here, our team co-ordinate manufacturing, storage and distribution of our products across the globe.

We have subsidiary offices and storage facilities in Europe and beyond, which help us maintain our product coverage and facilitate ease of trade with our customers, globally.











“ Bio-stimulants are substances which stimulate the plants natural processes to enhance nutrient uptake efficiency, stress tolerance and crop quality ”

The pressure to reduce chemical inputs, used for plant protection, due to environmental concerns has gathered substantial momentum over the last decade. Alternative natural sustainable solutions have been promoted at a rapid pace to counter the reduction in new approvals and reduced listings of the approved chemical products. Many of the alternatives are bio-stimulant and nutrition based with several having a long history of applications within agricultural, horticultural and amenity situations.

Indigrow has spent several years researching many natural and nutrient based alternatives to assist growers in regards to some perennial wide spread difficulties that lead to reduced quality and yield such as salinity and drought stress nutrient deficient soils also the changing climate extremes of weather currently experienced.

The requirement to reduce the reliance on chemical pesticides has hastened the need for supplementary and complementary natural products in their place. Indigrow has developed the Spectrum range of products as solutions to expand the growers product choice to maintain and enhance the quality and yield of produce.





## The range:

The Spectrum range of products are designed to work effectively in conjunction with one another to provide the maximum benefit to the plant and soils as part of an integrated complementary strategy to potentially reduce the reliance on chemical treatments. The unique bio-stimulant properties of Spectrum ROS, BIO and AA in conjunction with the natural chitin content of Spectrum CHI combined with the innovative foliar nutrition properties of Spectrum Pi, Ti, Si, Zn and HA ensure excellent all-round plant health and colour, with less reliance on plant protection products.



## Spectrum Pi: Phosphite Liquid

Normally, P is supplied to the plant as Phosphate ( $\text{PO}_4$ ) as it is manufactured from Phosphoric Acid. Phosphite ( $\text{PO}_3$ ) is made from Phosphorous acid. During the manufacturing process the acid is neutralised by a base (normally Potassium Hydroxide). Therefore as an additional benefit Spectrum Pi also contains Potassium.

### What is the effect of Phosphite?

- ▶ Rapidly absorbed by the leaf
- ▶ Easily translocated to all parts of the plant
- ▶ Stimulates natural plant auxin production
- ▶ Increases plants natural defence mechanism towards some pathogens
- ▶ On young crops – initial effect is to increase root mass, leading to subsequent benefits on yield and quality

Trials have shown that Spectrum Pi offers growers a higher marketable yield, when applied to potatoes.

Applied as a foliar spray to potatoes at early tuber initiation, Spectrum Pi will ensure survival of initiated tubers, leading to higher tuber numbers. This effect will be particularly noticeable when phosphate availability is reduced either due to adverse soil conditions or as a result of reduced fertiliser applications.



### Seed potato trial undertaken in West Bengal, India

On a further trial in Sri Lanka, yield increases of up to 20% were also observed, when 0.25 l/ha of Spectrum Pi was applied with every blight spray. More importantly, the use of Spectrum Pi also offers improvements in yield quality with the tuber skins 'setting' more readily and not shedding after harvest. The incidence of Blight was greatly reduced where Spectrum Pi was used.



| Yield                          | Control | Spectrum Pi (two applications<br>1.5lt/ha + 1.0lt/ha) |
|--------------------------------|---------|---|
| Average Tuber number per plant | 4       | 5.95  |
| Average Tuber weight (g)       | 20.8    | 21.1  |
| Average weight per plant (g)   | 83.2    | 125.5   |
| Calculated Yield (tonnes/ha)   | 11.9    | 14.5  |

The trial results found a 2.6 tonnes/ha increase in marketable yield when using two applications of Spectrum Pi over the control plot.

This represents a **21.8%** increase in yield

## Spectrum Ti: Titanium, A Beneficial Crop Nutrient

With many foliar applied nutrients it is vital that they are in a plant available form and soluble as application and uptake is crucial to the efficacy. Titanium is an abundant element although often unavailable. It is both synergistic with iron at low levels and antagonistic at high levels.

Historically Titanium has been used to enhance nutrient use efficiency. The benefits of the nutrient have been researched and publicised in peer reviewed academic papers, which has categorised titanium as having bio-stimulant qualities in the way it triggers biochemical processes when applied to plants.

## SPECTRUM Pi

### Phosphite liquid

Analysis (% w/v):  
4-43-19



Liquid



Foliar

#### BENEFITS

- Increases root mass in young crops, leading to increased crop yield and quality
- Increases plants natural defence mechanism towards some pathogens
- Stimulates natural plant auxins production
- Rapidly absorbed by the leaf and translocated to all parts of the plant



Spectrum Pi is a unique phyto-protectant based on activated phosphorus (ion phosphite). It helps to increase crop vigour and activates the metabolism that strengthens natural defences against fungal diseases. The highly concentrated phosphite formulation is easily absorbed by the crops, through the plant leaf. Applications early in the plants development will increase plant rooting and lead to better establishment. The added potassium provides greater weight and size of the crop and will help increase and intensify fruit colour.

## SPECTRUM Ti

### Liquid Titanium

Analysis (% w/v):  
0.6% Ti, 0.5% Fe, 3.0% Mn,  
6.3% Zn, 0.3% B



Liquid



Foliar

#### BENEFITS

- Increase Nitrogen usage efficiency
- Enhanced uptake of Iron (Fe) and Magnesium (Mg)
- Significant increase in chlorophyll levels
- Improve development of biomass

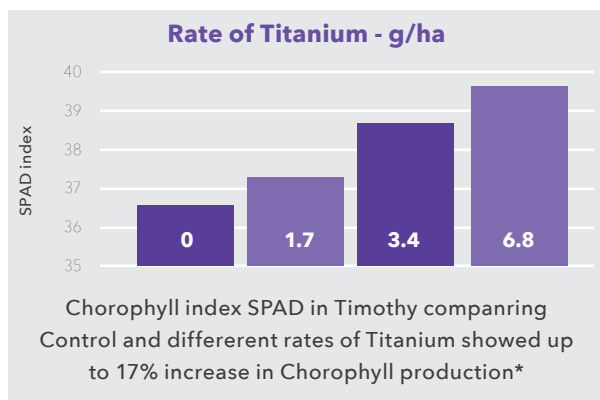


Titanium is a beneficial crop nutrient. Spectrum Ti is a liquid formulation, designed to be easily taken up by the plant. Applications of Spectrum Ti will help the plant utilise nitrogen more efficiently, which will lead to an increase in crop mass and an acceleration in the both the uptake of iron (Fe) and Magnesium (Mg) from the soil. The result is increased chlorophyll production and an increase in plant mass, which enhances the overall production and nutrient use for the crop.



One of the main effects cited by the research is the increase in Chlorophyll production. This is just one of many actions that occur when Ti in the plant available form are applied. The mode of action of titanium can be broken down into several metabolic processes.

Initially Ti is taken up by ligands that would ordinarily be occupied by iron and magnesium this is most prevalent at low levels of iron resulting in a synergistic effect.



The first reaction of the plant is to build biomass and results from increased nitrate reductase production creating a cyclical process to build mass and uptake and assimilation of nitrogen.

The second major process is the increased uptake of iron (Fe) and magnesium (Mg) from the rhizosphere, where the roots are primed to increase more active foraging for these nutrients.

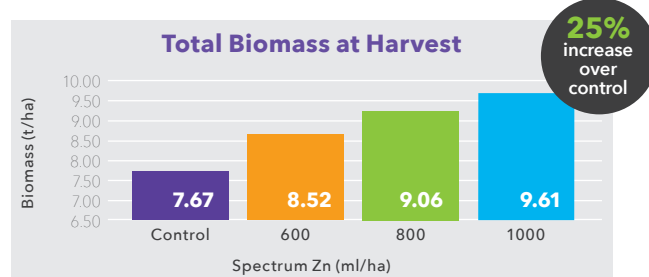
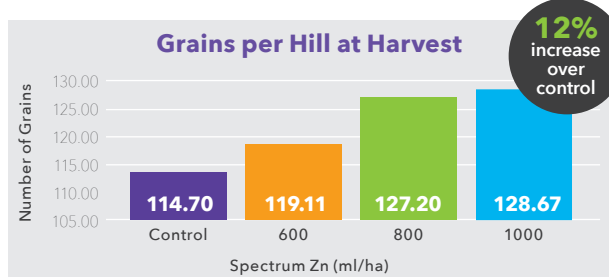
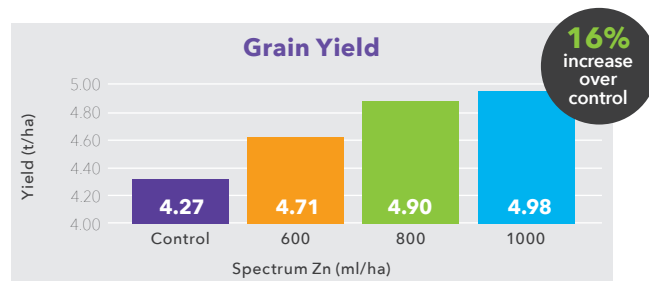
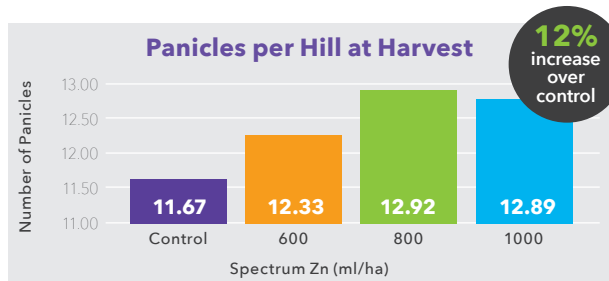
The overall result is increased biomass and chlorophyll production which has been the initial findings of our independent field trial. The formulation has not only a unique highly soluble titanium, but also a balanced micronutrient package and a unique biopolymer to increase the efficacy of the product.

## Spectrum Zn: Zinc

Spectrum Zn is a novel zinc liquid complex, which has been fully formulated with biodegradable adjuvants for optimal performance.

Zinc is a major contributor to the synthesis of Tryptophan which in turn is a building block for the Auxins naturally being produced by the plant. By introducing a highly active source of zinc early in the crops' development, auxin production is stimulated so leading to a larger early root system.

This larger root system is able to source more nutrients at an earlier stage and so leads to an increased Leaf Area Index, Chlorophyll production and increases in the components of yield such as Tiller number, Ears per sq.m., Number of grains per sq.m and Total Biomass in a wide range of crops.







## SPECTRUM Zn

### Liquid Zinc

Analysis (% w/v):  
7.5% Zn



Liquid



Foliar

#### BENEFITS

- Early application offer larger initial root system
- Assists in enhancing root development
- Increased leaf area index and chlorophyll production
- Higher tiller numbers and increased crop yield



Spectrum Zn is a unique combination of macro and micro nutrients to provide a highly available and mobile formulation of zinc to all crop types that need assistance with enhanced root development. By introducing Spectrum Zn early in the crops' development, growth is stimulated, leading to a larger and more advanced root system. This increased root mass is more able to take up nutrients at an earlier stage and so leads to an increased leaf area index, improved chlorophyll production and increases in crop yield.

## SPECTRUM Si

### Silicon liquid

Analysis (% w/v):  
10.0% SiO<sub>2</sub>



Liquid



Foliar

#### BENEFITS

- Silicon helps the plant to control and recover after hydric stress
- Aids plants in resisting pest and disease control
- Amorphous silica formulations is immediately available to plants
- Lower pH formulation for better compatibility and mixing



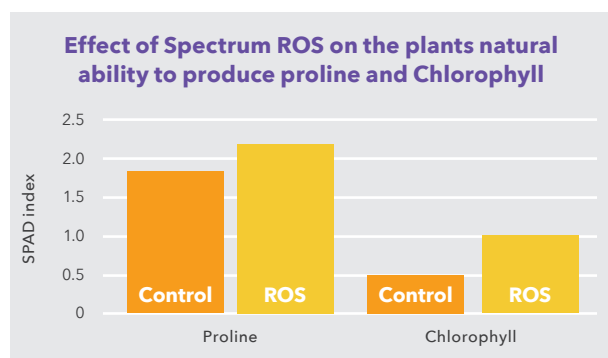
Spectrum Si is a highly available liquid formulation of 10.0% amorphous silica (SiO<sub>2</sub>), which provides excellent bioavailability. The silicon in our formulation is in the most available form for the plant, and our use of nano technology maximises plant uptake of this advanced formulation. Spectrum Si helps to improve plant health and resistance to disease, as well as strengthening and increasing the stiffness of plant cell walls and tissues. Applications can also assist in reducing pest attack whilst also increasing light absorption, photosynthesis and growth.



## Spectrum ROS: *A natural plant bio-stimulant*

Crops experience 'stress' from a wide range of biotic and abiotic factors including drought, water logging, salinity and temperature fluctuations. These symptoms of stress can cause a reduction in Chlorophyll production, metabolic function leading to reduced produce yields and quality.

The raw materials for Spectrum ROS are derived from sustainable plant sources which have evolved in harsh environments and produce significant amounts of these amino acids in order to survive. These amino acids and osmolytes maintain the osmotic balance of the plant cells to enhance functionality of the organelles, maintain turgidity and reduce the impact and subsequent damage of reactive oxygen species (ROS).



One of the plants natural defence mechanisms to the many plant stresses is to increase the production of the amino acid Proline, which reduces the damaging 'Free Radicals' which attack plant cells. Our latest trial work highlights the impact Spectrum ROS has on the plants

natural ability to produce a range of amino acids, including Proline, as well as increasing chlorophyll levels.

Due to the targeted osmolytes plant health was maintained by balanced osmotic regulation, cell membrane protection, reduction in free radicals and therefore protection of photosynthetic and biological pathways.

Spectrum ROS has been developed as targeted stress relief of abiotic stress in a concentrated formulation for increased rapid impact. The formulation is based on sustainable naturally produced plant osmolytes specifically aimed at countering many stressful situations including anaerobic, UV, drought and saline conditions.

## SPECTRUM ROS

### Concentrated Amino Acids

**Analysis (% w/v):**  
30% amino acids



Liquid



Foliar

### BENEFITS

- Naturally derived concentrated sustainable plant stress relief agent
- Helps maintain ideal water balance within crops cells
- Stimulates the plants natural production of amino acids, including proline
- Highly concentrated to offer a very low application rate



Spectrum ROS is a sustainable plant derived extract, for use when crops are under threat of biotic and abiotic stresses. These stresses include: extreme climatic conditions, poor soil environment (including salinity), waterlogging (anaerobic) and drought as well as pest and disease attack. It contains amino acid derivatives extracted exclusively from plant species that have evolved natural resistance to abiotic stress. Spectrum ROS is an osmolyte and therefore plays a major role in maintaining cell water balance.



## Spectrum BIO: Liquid Seaweed

One of the bio-stimulants we offer is manufactured from seaweed. Indigrow's seaweed products comprise a unique range of molecular seaweed and carbohydrate extract products. These seaweed products are produced using *Ascophyllum nodosum*, grown at a renewable, sustainable and environmentally friendly source.

Indigrow utilise seaweed for its ability to stimulate root growth. The seaweed helps the plant to produce thicker and longer roots with more root hairs leading to an increase in water and nutrient scavenging and the plant's ability to thrive in stress situations.

### SPECTRUM BIO

#### Liquid Seaweed Extract

Analysis (% w/v):  
24.0% dry seaweed matter



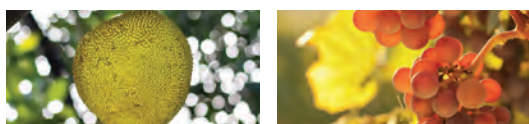
Liquid



Foliar

#### BENEFITS

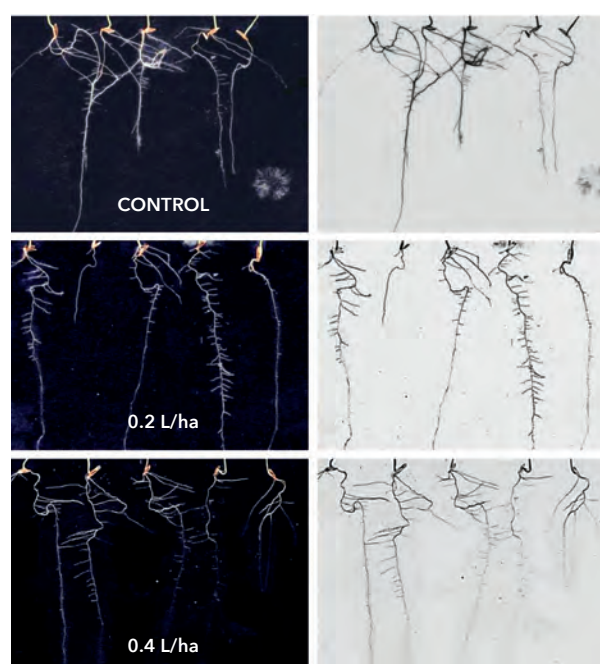
- Increases seed germination and early root development
- Improves resistance to diseases including fungi and nematodes
- Enhances crop vigour and therefore increases yields
- Shortens growth cycle and offers more uniform ripening



Spectrum BIO is a highly bioactive liquid, manufactured from *Ascophyllum nodosum* seaweed extract. It acts as a plant biostimulant, anti-stress agent and soil conditioner. It is uniquely produced using a non-aggressive, non-chemical technique (cold press water extraction). This ensures that beneficial proteins, vitamins and polyphenols kept in the product during the manufacturing process. Spectrum BIO will help limit overall biotic and abiotic stresses, whilst promoting root growth and increased uptake of nutrients from the soil.

The seaweed used in Spectrum BIO is extracted from the plant using the latest cold cell burst technology. This technology is designed to keep all of the marine molecules intact, allowing them to maintain their bioactive properties. The seaweed extract used in Spectrum BIO is rich in alginic acid, mannitol, amino acids, minerals and other plant hormone-like molecules. The end product is concentrated and finely filtered to ensure maximum solubility and guarantee ease of application.

**Indigrow has undertaken tests to show the effectiveness of Spectrum BIO in increasing root:**



Spectrum BIO has positive effects on individual roots: it increases root length, lateral root proliferation, and root width / thickness – and thus the network perimeter. It also has positive effects on the root network: it increases network length and width and hence network convex area, and induces a deeper network distribution.



*We have extensively trialled our seaweed products, please contact us if you would like to see our independent university research data.*

**Contact us at  
[growth@indigrow.com](mailto:growth@indigrow.com)**

## Spectrum CHI: Chitosan, A Sustainable, Natural, Bio-polymer

Chitin is the second most abundant polymer after cellulose and is found in the exoskeletons of arthropods and fungi. Chitin is the raw material, in our case, extracted from crustacea shells. The processing involves the chemical processes acetylation and deacetylation in order to convert the chitin into chitosan, to give us a usable product. The chitin is processed into an oligosaccharide which is more soluble and more biologically active.

Chitosan is a non-toxic, biodegradable and is believed to have no negative environmental impact making it a very effective product for both users and the environment.

Our liquid formulation is designed to enhance crop health and help develop resilience to perturbation throughout the growing season. A scheduled and planned approach will offer maximum benefits to maintain health by pre-empting periods of increased biotic and abiotic stress pressure.

Chitosan oligosaccharide has been shown through peer reviewed research over many decades to trigger defensive responses to biotic and abiotic stress when applied to crops it also has priming effects to enhance microbial activity.

### SPECTRUM AA

#### Amino Acid liquid

**Analysis (% w/v):**  
35.0% L-amino acids



Liquid



Foliar

#### BENEFITS

- Quickly metabolised to stimulate plant biochemical pathways
- Relieves plant stress symptoms
- Stimulates flowering and improves fruit setting and crop yield
- Improves size and colouration of fruits and maturity indexes



Spectrum AA is a plant bio-stimulant containing 35.0% plant available L-amino acids, which help trigger improved plant metabolism. This increase in metabolic activity supports the critical development stages of the plant including: rooting, budding, flowering, pollination and fruit setting. Use of Spectrum AA is recommended to help plants overcome and recover from stress situations such as transplantation, drought, frost and other negative effects such as fungal diseases and pest attack. The L-amino acids in Spectrum AA are the only ones that can be assimilated by plants and have structural (supportive), metabolic (enzymes), transport functions.

### SPECTRUM HA LIQUID

#### Humic Acid liquid

**Analysis (% w/v):**  
17.2% humic acid,  
15.1% fulvic acid



Liquid



Foliar/Soil

#### BENEFITS

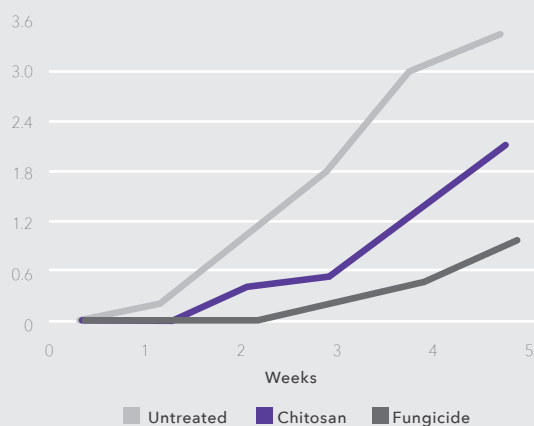
- Stabilises/buffers the soil against large changes in pH
- Increases and stimulates beneficial microorganisms
- Enhances Cation Exchange Capacity
- Beneficial in situations of drought, frost and waterlogging



Spectrum HA Liquid is a combination of 17.2% humic and 15.1% fulvic acids. This enhances the uptake of mineral nutrients and improves the soil structure, including its water-retaining capacity and fertility. Humic and fulvic acids form complexes with microelements, preventing the problem of deficiencies as well as stimulating root formation and increasing crop yield.



### Effect of Chitosan on disease incidence



\*(Velasquez and Pirela; 2016)

One of the main theories is that the chitosan causes a vaccine like effect on the crop which builds the cell wall protection and lignification.

The plants natural reaction to chitin is to produce chitinase as a defence against organisms that contain chitin and as a consequence the chitinase impacts these chitin containing organisms. Chitinous materials therefore increase the resilience of crops to many pests and disease this along with having a priming effect, stimulating/supporting the growth of beneficial micro-organisms, and by the elicitor activity of chitin reduces the effects of abiotic and biotic stress promoting shelf-life longevity.

## SPECTRUM HA SOLUBLE

### Soluble Humic Acid

**Analysis (% w/w):**  
70.0% humic/fuvic acid



Powder



Foliar/Soil

#### BENEFITS

- Stabilises/buffers the soil against large changes in pH
- Increases and stimulates beneficial microorganisms
- Enhances Cation Exchange Capacity
- Beneficial in situations of drought, frost and waterlogging



Spectrum HA Soluble is a water soluble product, containing 70.0% humic substances. This enhances the uptake of mineral nutrients and improves the soil structure, including its water-retaining capacity and fertility. Spectrum HA Soluble contributes to the relationship between the soil and the plant to increase nutrient uptake. It also chelates trace elements to form complexes with these microelements, preventing the problem of deficiencies. It also stimulates root formation and increases crop yield.

## SPECTRUM CHI

### Liquid Chitosan

**Analysis (% w/v):**  
10.0% Chitosan



Liquid



Foliar

#### BENEFITS

- Strengthens plants resistance to disease, pest damage and drought
- Derived from natural, sustainable raw materials
- Highly concentrated to offer a very low application rate
- Soluble formulation to enhance availability and absorption



Spectrum CHI contains a sustainable bio-stimulant derived from Chitin which is found in the shells of arthropods and fungi. Our manufacturing process turns the raw material into chitosan oligosaccharide, the complex carbohydrate compound, which is a plant available form. Spectrum CHI offers improved soil health and enhances nutrient availability to crops by increasing the plants root mass. Spectrum CHI also increases the plants natural resilience to abiotic stress by triggering an immune response resulting in a stronger cell wall, to increase the plants natural resilience and resistance.







“Foliar fertilisation is a widely used crop nutrition strategy of increasing importance worldwide. Used wisely, foliar fertiliser will complement soil fertilisation and will be more environmentally friendly”

Not all liquids are true foliar feeds. One of the key benefits of a true foliar feed is that the nutrients are absorbed through the leaf of the plant and bypass the root system, even in high stress conditions. This not only maximises nutrient uptake but reduces leaching of nutrients into the environment unlike conventional liquid fertilisers. Indiflo foliar feeds penetrate the epidermis and transcuticular pores on the foliage, which are open virtually all the time compared to stomata.

Our Indiflo range of activated foliar feeds has been developed to include proprietary complexing agents, surfactants and other formulation aids to provide enhanced uptake and utilisation whilst reducing leaching and volatilisation. The range uses a blend of organic acids, carbohydrates, and other natural organic formulants to achieve optimum leaf uptake and nutrient translocation.



## The range:

Indiflo liquids are based on proven technology which has been used in foliar fertilisation of agricultural and horticultural crops for in excess of 10 years. These advanced formulations take in to account:

- ▶ Long term storage stability
- ▶ Mixing, miscibility or dissolution in spray water
- ▶ Compatibility with other products in the sprayer
- ▶ Ability to cover the leaf surface, adhesion and rainfastness
- ▶ Cuticle penetration and leaf uptake
- ▶ Mobility and translocation within the plant

In order to satisfy the above criteria a number of individual surfactants and surfactant systems have been developed and proved in practice. These adjuvants, along with other additives for buffering spraying water pH and removing unwanted ions from hard water, ensure optimal technical performance in the field.



## Foliar Fertilisation

Foliar feeding ensures that nutrients are taken up by the leaf, and not by the plants root system. Research shows that different nitrogen sources are taken up at different rates, and our formulations have been developed to take account of this.

Historically the access into foliage for liquid fertilisers was through stomatal openings. These large openings are more often closed than open.

When Indiflo foliar feeds are applied to the plant leaf, they are absorbed through transcuticular pore spaces. These numerous but smaller pores are always open. Indiflo foliar fertilisers are formulated so the molecules are small enough to pass through

### INDIFLO K

#### Potassium foliar feed

Analysis (% w/v):  
0-0-36



Liquid



Foliar

#### BENEFITS

- A readily plant available source of potassium
- Provides firmer fruit and vegetables which demand a higher market price
- Reduces cation leaching, as well as the risk of potassium loss
- Can be applied to alkaline and salt-affected soils to help lower the pH level at the root surface



Indiflo K is a high concentrated liquid foliar fertiliser providing a readily available source of potassium, which is easily absorbed by crops. Indiflo K offers growers an increase in yield, and gives higher quality produce by improving the size and consistency. Additionally, Indiflo K contains added sulphate, which further enhances crop nutrition to help produce high quality crops with maximum export value. Indiflo K is chloride free and makes no significant contribution to soil salinity.





these pore spaces and penetrate the leaf.

Once the nutrients have been absorbed through the transcuticular pore spaces, they are translocated

throughout the plant leaf. This is particularly important in warm and hot climates as in these conditions, roots are under increases stress and therefore have a reduced ability to take in nutrients.

## Storage Stability

Indiflo formulations are manufactured using a specifically selected high grade of inorganic salts which are very low in impurities. During the manufacturing process the liquefied raw material is either filtered or allowed to settle for 24 hours, so reducing any remaining impurities to a minimum.

## INDIFLO Ca

### Calcium foliar feed

**Analysis (% w/v):**  
22.0% CaO



Liquid



Foliar

#### BENEFITS

- Applications will correct calcium deficiencies
- Better quality, yield, shelf-life and storage characteristics
- Lignosulphonate complexing agent helps rapid Calcium assimilation
- Greater tolerance to stress and other plant diseases



Indiflo Ca is a special based calcium formula, specific for the prevention and cure of all disorders from calcium deficiencies (apple bitter pit, spotting of peppers, apical rotting of tomatoes, drying of melon leaves; tip burning of lettuces and chicory; cherry cracking of the drupe). The low molecular weight complexing agent allows the calcium to be rapidly assimilated and transported throughout the plant. Indiflo Ca improves quality and yield of the harvests as well as the shelf-life and storage of the fruit as well as increasing the tolerance to stress and other plant diseases.

## INDIFLO Ca+Mg

### Calcium & Magnesium foliar feed

**Analysis (% w/v):** 8.8% CaO,  
4.3% MgO + 3.0% N



Liquid



Foliar

#### BENEFITS

- Prevents and corrects symptoms of Ca and Mg deficiency
- Calcium content helps increase cell wall division and elongation
- Magnesium content helps improve plants ability to photosynthesise
- Increases crop quality and extends postharvest life



Indiflo Ca+Mg is a liquid combination of calcium and magnesium to help rectify deficiencies in all kind crops especially in light, highly acid or alkaline and organically poor soils. The added calcium activates cell walls division and elongation and directly enhances the growth of youngest leaves and fruits, to avoid necrosis and deformations. The magnesium content increases photosynthesis, iron utilisation and sugar and enzyme synthesis which in turn prevents leaf drop.



## Mixing, Miscibility and Dissolution

The Indiflo formulations are very "heavy" with a specific gravity often over 1.35 due to the high amounts of other formulants in the product. Once they have been added to the spray tank they are 100% soluble in the water. Within the formulation there is an acidifying component which not only helps with the mixing and compatibility but also nutrient uptake.

### INDIFLO Mg

#### Magnesium foliar feed

**Analysis (% w/v):**  
12.7% MgO



Liquid



Foliar

#### BENEFITS

- Applications help prevent magnesium deficiency
- Helps increase valuable components like citric acid and vitamin C
- Assists in cell division and protein formulation
- Easily absorbed magnesium, which is essential for photosynthesis



Indiflo Mg has been developed to prevent and correct symptoms of magnesium deficiency, particularly in citrus and fruit trees. Magnesium is essential for chlorophyll production and is important for the production of adenosine triphosphate (ATP) and component of pectin (important for stability of cell). Indiflo Mg also increases the concentration of valuable components such as citric acid and vitamin C.

### INDIFLO TRIPLE

#### Micronutrient foliar feed

**Analysis (% w/v):**  
3.0% Mn, 4.0% Zn,  
0.75% Cu



Liquid



Foliar

#### BENEFITS

- Corrects manganese deficiencies commonly found in soils with high pH and sandy soils
- Improves secondary root growth and fruit setting
- Increases yield
- Stimulates early root growth, leading to a larger root system



Indiflo Triple is formulated from a combination of manganese, zinc and copper. The high concentration of zinc promotes growth in new and pre-existing roots. Indiflo Triple also improves secondary root growth, fruit setting, as a consequence increases in yields. The highly active source of manganese is ideal to rectify deficiencies commonly found in soils with high pH and in sandy soil. Indiflo Triple will also assist in the chlorophyll synthesis process, elongation of cells and in auxin metabolism.



## Product Compatibility

The complexing agents within the formulation ensure that the 'nutrient' element is protected from adverse chemical reactions with any pesticides which may be added to the tank mix.

## Leaf Surface Adhesion

Carefully chosen surfactants reduce the surface tension of the spray droplet allowing for optimum spread and contact with the leaf surface, whilst at the same time giving a degree of rainfastness.



### INDIFLO TRIPLE MAX

#### Micronutrient foliar feed

**Analysis (% w/v):**  
5.0% Mn, 2.0% Zn,  
0.75% Cu



Liquid



Foliar

#### BENEFITS

- Corrects manganese deficiencies commonly found in soils with high pH and sandy soils
- Improves secondary root growth and fruit setting
- Increases yield
- Stimulates early root growth, leading to a larger root system



Indiflo Triple Max is formulated from a combination of manganese, zinc and copper. The high concentration of manganese is ideal to rectify deficiencies commonly found in soils with high pH and in sandy soil. Indiflo Triple Max also improves secondary root growth, fruit setting, raising, as a consequence increase in yields. The highly active source of zinc improves the crops early development and growth due to the larger early root system. This larger root system is able to source more nutrients at an earlier stage which leads to an increased leaf area index, chlorophyll production and increases yield.

### INDIFLO Cu

#### Micronutrient foliar feed

**Analysis (% w/v):**  
4.0% Cu



Liquid



Foliar

#### BENEFITS

- Assists in correcting copper deficiencies to speed up crop maturity
- Increases the synthesis of chlorophyll and lignin
- Acts as a protective barrier against invasive fungi
- Applications offer an improvement in seed and fruit yields



Indiflo Cu is a foliar fertiliser containing 4% copper, commonly used to correct copper-deficient soils. It has been carefully formulated to supply the exact amount of required copper for the synthesis of chlorophyll, lignin and participation in the metabolism of carbohydrates and proteins. Applications of Indiflo Cu helps improve disease resistance, increased seed and fruit yields and helps to reduce wilting.

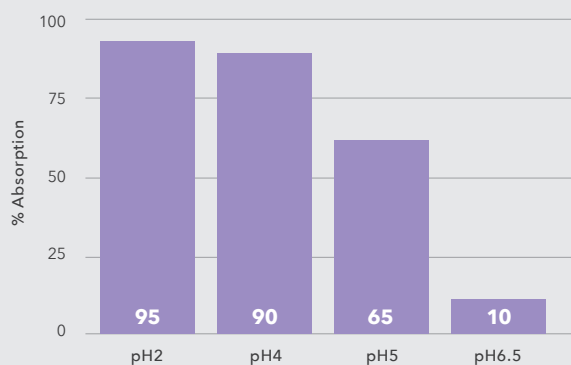
## Nutrient Uptake

The efficiency of uptake of many nutrient elements is enhanced by a slightly acidic solution and where possible, all Indiflo formulations are buffered to take account of this. The spreading action of the surfactants allows uptake through the cuticle of the leaf and does not limit penetration to the stomata.



### Effect of Water pH on Uptake

Relative Absorption of Phosphate by Leaves at Differing pH Spraying Water



## INDIFLO Fe

**Micronutrient foliar feed**

**Analysis (% w/v):**  
6.5% Fe



Liquid



Foliar

### BENEFITS

- Corrects iron shortages to reduce leaf necrosis and improve vegetative development
- Reduces bud and flower drop
- Combined application of iron maximises fruit yield
- Improves fruit qualities and uniformity (size and colour)



Indiflo Fe is a foliar fertiliser containing iron chelated with lignosulphonates specially formulated to prevent and correct iron deficiency commonly present in high pH, compacted and sandy soils. Indiflo Fe increases the plants ability to synthesize the chlorophyll and nitrogen fixation which helps prevent leaf chlorosis and helps to increase the yield and improve the crop quality.

## INDIFLO Mn

**Micronutrient foliar feed**

**Analysis (% w/v):**  
15.0% Mn



Liquid



Foliar

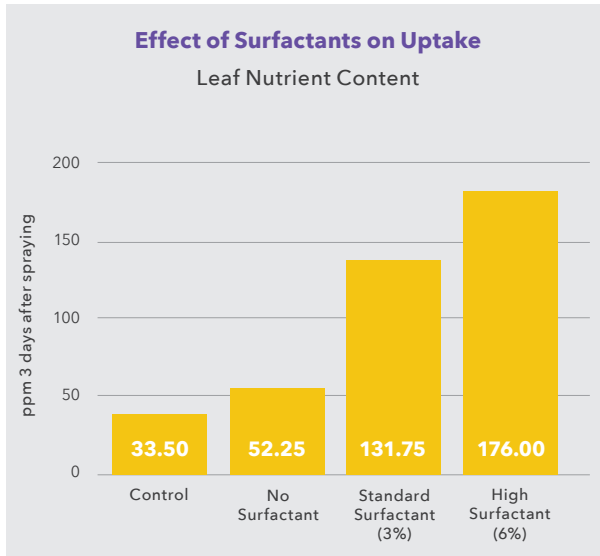
### BENEFITS

- Readily absorbed manages foliar feed to correct deficiencies
- Increases synthesis of fatty acids and vitamins
- Applications are particularly important for soils high in organic matter
- Improves chlorophyll synthesis and the elongation of cells



Indiflo Mn improves secondary root growth, fruit setting and raising, resulting in an increase in crop yield. Manganese is indispensable for the chlorophyll synthesis, elongation of cells and is involved in the auxins metabolism. Indiflo Mn assists in the synthesis of fatty acids, uptake of vitamins and the conversion of nitrogen from nitrates. It also assists in the processes of photosynthesis and respiration and it stimulates the activity of many coenzymes that offer increase resistance to frost.





## INDIFLO Zn

### Micronutrient foliar feed

Analysis (% w/v):  
12.0% Zn



Liquid



Foliar

#### BENEFITS

- Increases synthesis of enzymes and vitamins
- Corrects zinc deficiencies, particularly in vegetable crops and fruit trees
- Promotes growth of both pre-existing and adventitious roots
- Improves flowering and seed set



Indiflo Zn is a foliar feed containing 10.7% zinc in an easily absorbed formulation. Commonly used to correct zinc deficiencies, Indiflo Zn is important to help increase the synthesis of enzymes and vitamins, which in turn helps promote both growth of pre-existing and adventitious roots. Applications of Indiflo Zn can improve flowering and seed set, as well as increasing tillering, improving fruit growth and quickening fruit senescence.

## INDIFLO NPK

### NPK foliar feed

Analysis (% w/v):  
19-3-3



Liquid



Foliar

#### BENEFITS

- Increases uniform vegetative growth and healthy flowering
- Offers increases stress relief from excessive heat, cold and drought
- Low salt index guarantees safety for the vegetable roots
- Recommended for crops which require initial nitrate nitrogen content, including bedding and ornamental plants



Indiflo NPK is a foliar fertiliser that stimulates the productive-vegetal development and can be applied during the whole growth cycle, particularly when plants need rapid integration of nutritive elements. It constitutes a seasonal complement for the crop, increasing its production and quality. Thanks to its high nitrogen content, Indiflo NPK helps to green-up plants, and the addition of phosphorus and potassium improves plant growth and helps to overcome abiotic stresses including excessive heat, cold and drought.







“ Solubility is a property referring to the ability for a given substance, the solute, to dissolve in a solvent ”

Water Soluble Fertilisers (WSF) can provide an economical method of supplying nutrients to a variety of crops. Often this is a favoured approach to nutrient maintenance on large areas to balance requirement rapidly and accurately with the benefit of even application and efficient uptake when applied via suitable spray equipment.

The most efficient method of application is little and often as with many fertilisers as this allows the optimum uptake and reduces potential nitrogen losses via volatilisation and leaching.

As well as the economic benefits of the high nutrient concentrations, WSFs suit situations where there is reduced storage which is often an issue. Reduced transport costs are also a key factor due to the lack of water content being transported.

In order to maximise the efficacy of any WSF the raw materials in the formulation must be of the highest purity. Confirmation by analysis guarantee of impurity content is fundamental to quality products with traceable provenance.



## The range:

The Indiplex range of soluble fertilisers are a complete range of fully soluble fertilisers for use in fertigation systems so both nutrients and water can be managed to maximise both yield and crop quality.

All of the products in the range will dissolve quickly and without any residue. The many different micronutrient formulas make it possible for a grower to choose the right product to counteract all deficiencies in almost every crop and at every stage of growth.

| Indiplex Formulation Features                   | Benefits   |
|---|--|
| <b>Added complexing agents</b>                  | <ul style="list-style-type: none"> <li>• Excellent compatibility, superior to other dry flowable fertilisers and economy bulk liquids</li> <li>• Reduction in tank-mix scorch</li> <li>• Complexing agents act as wetting and spreading agents</li> </ul>  |
| <b>Organic complexing agents and acidifiers</b> | <ul style="list-style-type: none"> <li>• Further complexes nutrient, leading to improved compatibility</li> <li>• Reduces pH of spraying water so maximising nutrient uptake and maintains activity of tank mix partners due to reduced pesticide hydrolysis</li> <li>• Rate of solubility improved. Mixing and filling times reduced</li> </ul> |
| <b>Water 'softeners'</b>                        | <ul style="list-style-type: none"> <li>• Remove unwanted ions from the spraying water (i.e. Mg, Ca and bicarbonate) leading to improvements in mixing, compatibility and efficiency of uptake of nutrients. Maximises pesticide performance</li> </ul>   |
| <b>High levels of nutrient</b>                  | <ul style="list-style-type: none"> <li>• Savings on packaging disposal, handling, storage and transport.</li> <li>• Avoid health and safety issues associated with 200 lt drums</li> <li>• Cost effective per hectare</li> </ul>   |



## Solubility

Solubility is a property referring to the ability for a given substance, the solute, to dissolve in a solvent. It is measured in terms of the maximum amount of solute dissolved in a solvent at equilibrium. The resulting solution is called a saturated solution.

Solubility is obviously key to the concept of WSFs. Minimal insoluble content is required for the highest quality products, with <0.05% being the bench-mark for our products.

Particle size is also vital for maximum solubility, with our products aiming for up to 99% of particles <1.0 mm this is to ensure no blockages to sprayer equipment and maximum surface area to increase solubility.

All products in the range are also formulated with anti-caking agents to maintain condition and flowability.

These WSFs are suitable for year round use in all climates they can all be used in tank mixes allowing for managers to supplement where necessary.

### INDIPLEX B

#### Soluble Boron

Analysis (% w/w):  
17.0% B



Powder



Foliar/Soil

#### BENEFITS

- Improves flowering, pollination and fruit development
- Reduces dropping of buds or blossom particularly in citrus, pear and olive trees
- Boosts sugar accumulation and optimises ripening
- Increases germination of pollen grains



Indiplex B is a soluble fertilizer containing 17% boron. Indiplex B has an important role in carbohydrate metabolism, protein synthesis, seed and cell wall formation, germination and sugar translocation. Using Indiplex B can assist with the correction of boron deficiency in crops, which in turn offers improved flowering, pollination and fruit development, as well as increased sugar accumulation and improved ripening. Indiplex B also offers users a reduction of dropped buds or blossom in citrus, pear and olive trees and shorter internode and growth reduction in potato and onion crops.

### INDIPLEX Cu

#### Soluble copper

Analysis (% w/w):  
20.0% Cu



Powder



Foliar/Soil

#### BENEFITS

- Highly soluble formulation of 20% copper
- Helps improve the synthesis of chlorophyll
- Reduces late maturing crops to maximise yield
- Improves flowering and fruit set



Indiplex Cu supplies copper for the synthesis of chlorophyll and participation in the metabolism of carbohydrates and proteins. Containing 20% elemental copper, Indiplex Cu helps rectify copper deficiencies to improve maturity and to help prevent yellowed leaves and lodging. It can also help improve flowering and fruit set in a wide range of crops. The availability of Indiplex Cu will be limited in soils with high pH, organic matter and excess of nitrogen and phosphorous, so measures to counteract these are encouraged before application.

## Formulation

These products are formulated with high levels of the unique formulation system that will ensure fast and efficient coverage, adhesion and uptake of the micronutrient at competitive cost. In addition the formulation is able to reduce the pH and 'condition' the spraying water by removing unwanted ions that could interfere with either nutrient uptake or pesticide efficiency. The complexing materials in these formulations confer improved levels of compatibility and crop safety when compared with alternative inorganic powders or economy liquid formulations.



In terms of cost per hectare, the Indiplex range offers one of the most cost effective trace element treatments and for foliar application is a viable alternative to expensive EDTA chelates.

### INDIPLEX Fe

#### Soluble iron

**Analysis (% w/w):**  
20.0% Fe



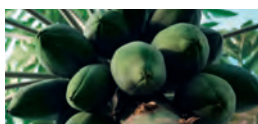
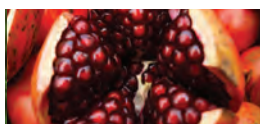
Powder



Foliar/Soil

#### BENEFITS

- Free from sodium, chloride and other harmful elements
- Reduces leaf necrosis and poor vegetative development
- Reduces bud and flower drop
- Improves fruit quality and uniformity (size and colour)



Indiplex Fe is a soluble fertiliser containing 20% iron based on lignosulphonates. It has been specially formulated to prevent and correct iron deficiency commonly present in high pH, compacted and sandy soils found in most, horticultural, ornamental and arable crops. Applications of Indiplex Fe will improve fruit quality and uniformity, as well as reducing leaf necrosis and flower drop to maximise crop yield and quality.

### INDIPLEX Mn

#### Soluble manganese

**Analysis (% w/w):**  
20.0% Mn



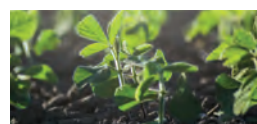
Powder



Foliar/Soil

#### BENEFITS

- Improves secondary root growth, fruit setting and raising
- Stimulates the activity of many coenzymes that induce resistance to frost
- The advanced formulation ensures fast and efficient coverage, adhesion and uptake
- Increases efficiency of the chlorophyll synthesis process



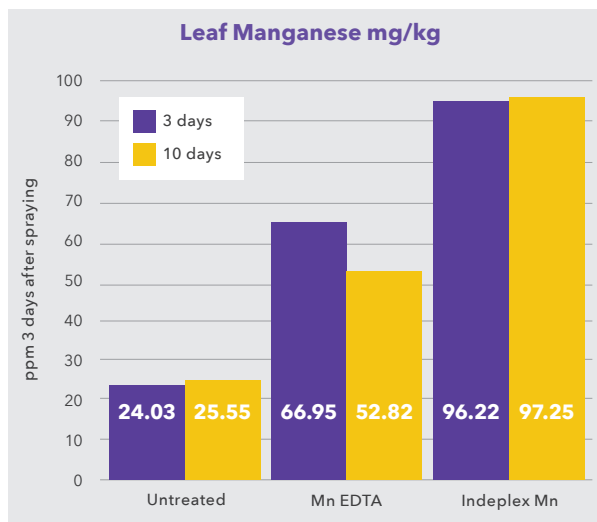
Indiplex Mn is a soluble fertilizer containing 20% elemental manganese. Manganese is vital to crops for the chlorophyll synthesis process, elongation of cells and it is also involved in the auxins metabolism. Indiplex Mn helps in the synthesis of fatty acids, some vitamins and the conversion of nitrogen from nitrates. Indiplex Mn improves secondary root growth, fruit setting and raising, and as a consequence offers an increase in yields.



## Efficiency of Uptake - Indiplex Mn

A series of trials were carried out under adverse uptake conditions. This time EDTA chelates were included as a comparison to Indiplex Mn. The trials showed that the Indiplex Mn formulation was more readily absorbed by the leaf of the plant, showing an increase over both the Mn EDTA formulation and the untreated plant.

The same manufacturing methods used in the production of Indiplex Mn are used across the whole Indiplex range.



## INDIPLEX Mo

### Soluble molybdenum

**Analysis (% w/w):**  
36.0%



Powder



Foliar/Soil

#### BENEFITS

- Meets high molybdenum demand crops including cabbage and cauliflower
- Highly soluble and easily absorbed by the plant
- Reduces flower drop in crops such as fruits, citrus and grape
- Applications rectify molybdenum deficiencies



Indiplex Mo is a soluble fertiliser containing 36% elemental molybdenum. In acidic soils molybdenum deficiency can arise because of high-molybdenum fixation. Indiplex Mo offers a cost effective solution to molybdenum deficiency which helps avoid chlorosis whilst maximising crop growth and leaf production. Applications will also improve flower and fruit setting. Indiplex Mo is particularly important for crops like cabbage and cauliflower due to the high molybdenum requirement.

## INDIPLEX Zn

### Soluble zinc

**Analysis (% w/w):**  
20.0%



Powder



Foliar/Soil

#### BENEFITS

- Improves synthesis of enzymes and vitamins
- Increases tryptophan synthesis which improve plant growth
- Promotes both growth in new and pre-existing roots
- Improves flowering and seed set

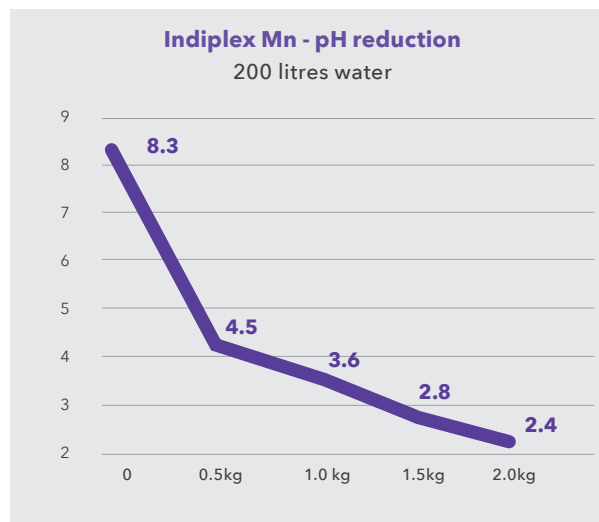


Indiplex Zn is a soluble fertilizer containing 21% elemental zinc. Zinc is related in many metabolic routes and therefore Indiplex Zn has an important role in synthesis of enzymes and vitamins, respiration process and nitrogen uptake. Indiplex Zn improves the synthesis of tryptophan, an essential amino acid, which promotes both growth of pre-existing and adventitious roots. Indiplex Zn also reduces the early drop of small fruits whilst maximising fruits growth and quickening fruit senescence.

## Water Conditioning

The acidification effect of Indiplex can be also of value when considering the penetration of other plant protection materials under colder conditions and direct comparisons can be made with specific acidifying penetrant adjuvants.

0.5 kg of Indiplex Mn will give the same effect on pH as the full dose of adjuvant at no additional cost. In most cases the addition of agrochemicals to the previously acidified water will raise the pH to between pH 5 - 6, which is optimal for foliar uptake and at the same time guards against any pesticide hydrolysis.



## INDIPLEX BUD

### Micronutrient powder

**Analysis (% w/w):**  
8.0% B, 7.0% Zn, 1.66% MgO,  
0.1% Mn, 0.1% Cu, 0.1% Fe



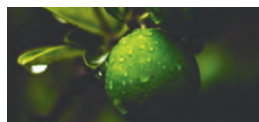
Powder



Foliar/Soil

### BENEFITS

- A readily plant available source of potassium
- Provides firmer fruit and vegetables which demand a higher market price
- Reduces cation leaching, as well as the risk of potassium loss
- Can be applied to alkaline and salt-affected soils to help lower the pH level at the root surface



Indiplex Bud is special EDTA chelated combination of Boron, Zinc, Magnesium, Manganese, Copper and Iron balancing the relation between these elements. It was formulated to correct multi nutritional deficiencies in all crops but specially fruit and tropical trees. Indiplex Bud combines microelements that play an important role in both flower and vegetative bud development improving pollination, minimising the early drop of the small fruits and reducing terminal bud necrosis. In vegetables and fruit trees, Indiplex Bud helps to prevent cracking, malformation and necrosis of fruits to maximise the commercial value of the crop.

## INDIPLEX KOMBI

### Micronutrient powder

**Analysis (% w/w):** 4.0% Fe,  
5.4% , 4.0% Mn, 1.5% Zn,  
0.5% B, 1.5% Cu, 0.1% Mo



Powder



Foliar/Soil

### BENEFITS

- A comprehensive micronutrient mixture containing chelates for rapid uptake by the crop
- Prevents main multiple micronutrient deficiencies in different stages of growth
- Helps maximise crop growth, development and yield
- Dissolves quickly and completely in water

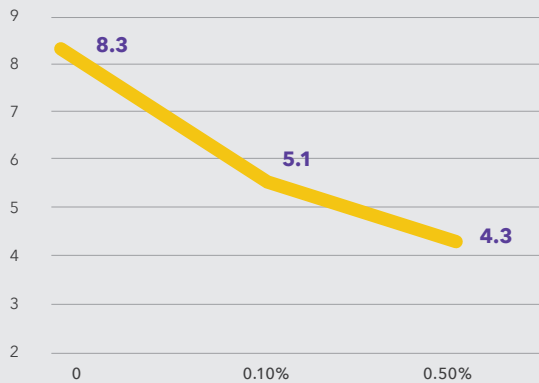


Indiplex Kombi is a soluble fertiliser with a multi-chelated formulation to correct main deficiencies of iron, manganese, zinc, boron and copper in a wide range of crops. Indiplex Kombi helps reduce leaf chlorosis and necrosis, early drop of the small fruits in vegetables, deformations on fruits, problems of pollination and seed viability. As well as preventing a range of issues, Indiplex Kombi offers an increase in plant growth and helps to maximise crop yield.



**Proprietary acidifying surfactant - pH reduction**

200 litres water

**INDIPLEX LEAF****Micronutrient powder**

**Analysis (% w/w):**  
 10.0% MgO, 7.0% Zn, 3.0% Mn,  
 0.5% Fe, 0.5% B, 0.1% Cu



Powder



Foliar/Soil

**BENEFITS**

- Helps to stimulate healthy leaf growth
- Fully water soluble fertiliser based on micronutrients
- Contains chelating and sequestering agents to assure maximum availability
- Increases fruit sugar content and optimises yield



Indiplex Leaf is a 100% soluble formulation manufactured from a combination of Magnesium, Zinc, Manganese, Iron and Boron, which has been developed to improve the leaves of the plant. It can be used to correct deficiencies in all major crops, particularly in light, highly acid, alkaline or organically poor soils. Indiplex Leaf helps to increase photosynthesis, iron utilisation, sugar and enzyme synthesis, auxin production and protein synthesis. Indiplex Leaf also stimulates healthy leaf growth and maximising the size of fruits as well as increasing fruit sugar content and improving crop yield.

**INDIPLEX TRIPLE PLUS****Micronutrient powder**

**Analysis (% w/w):**  
 10.7% Mn, 10.7% Zn,  
 3.5% Cu, 1.4% B



Powder



Foliar/Soil

**BENEFITS**

- Corrects manganese and zinc deficiencies
- Increases yield
- Stimulates early root growth, leading to a larger root system
- Improves secondary root growth and fruit setting



Indiplex Triple Plus is a highly soluble formulation containing a combination of manganese, zinc, copper and boron. The high concentration of manganese is ideal to rectify deficiencies commonly found in soils with high pH and in sandy soil. Indiplex Triple Plus also improves secondary root growth, fruit setting, as a consequence an increase in quality. The highly active source of zinc improves the crops early development and growth due to the larger early root system. This larger root system is able to source more nutrients at an earlier stage which leads to an increased leaf area index, chlorophyll production and increases yield.









“ Micronutrients are a chemical element or substance required for the normal growth and development of plants and crops ”

Crops require a wide range of nutrients for successful growth and to maximise yields. Without these nutrients, deficiencies can easily occur. As demands are placed on growers across the globe to increase their yields and increase the speed of crop production, more and more nutrients are stripped from the soil by pH lock up, leaching, erosion and offtake by the crops.

*Micronutrients are known to provide a key role in:*

- ▶ Long term storage stability
- ▶ Plant and root development
- ▶ Fruit setting and grain filling
- ▶ Seed viability
- ▶ Plant vigour and health
- ▶ Producing higher yields
- ▶ Increasing harvest quality

Micronutrients can also help the plant better utilise some of the major and macro nutrients which are applied to the plant, helping growers maximise their fertiliser budget to its full potential.



## Anvil Ortho 4.8 - Maximising Uptake

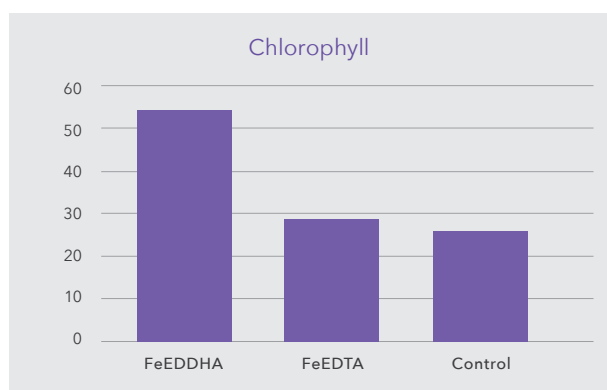
The use of high quality nutrients that are readily available and readily taken up by crops have been proven to increase both yields and quality of produce especially in areas where the soil types and available water supply make nutrition particularly challenging.

Iron deficiency is often a major limiting factor very difficult due to soil conditions such as salinity, soil moisture, low temperature, carbonate levels and concentration of other competitive elements, including phosphorus, hydroxide ions and calcium, which also effect availability.

It is important to apply iron directly to the soil in certain situations. Even in situations where there are adequate levels of iron in the soil, this iron may not be available to the plant as it is bound to the soil in the Fe<sup>3+</sup> form.

The most effective way of supplying plant-available iron in high pH conditions is in the form of FeEDDHA, more specifically in the Ortho-Ortho [O-O] form. This is due to the position of the iron molecule that increases activity and higher persistence, compared with Ortho-Para and Para-Para formulations. This is particularly important where soil pH is between 7 and 11.

Iron plays an important in chlorophyll production and therefore photosynthesis. The form in which the iron is applied is particularly relevant. Iron, in the FeEDDHA form helps the plant produce more chlorophyll than other forms. To ensure maximum iron availability and the highest level of chlorophyll production, Anvil Ortho 4.8 is manufactured in a FeEDDHA Ortho-Ortho formulation.



## Anvil Tropical - Minimising Deficiencies

Major, macro and micro nutrients all have an important role to play in crop growth.

Additional nutrition is required for the usual growth and development of crops and plants. There are a range of essential nutrients, which every crop will need throughout the growth cycle.

When plants do not have enough of these essential nutrients, a wide range of deficiency symptoms are shown.



### ANVIL ORTHO 4.8

#### Fe EDDHA powder

**Analysis (% w/w):**  
6.0% Fe



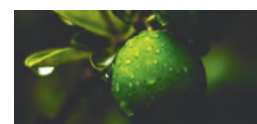
**Powder**



**Soil**

#### BENEFITS

- Contains highly active ortho/ortho isomer content of 4.8% iron
- Assists in the prevention and treatment of iron chlorosis
- Highly metabolised
- Increases chlorophyll synthesis

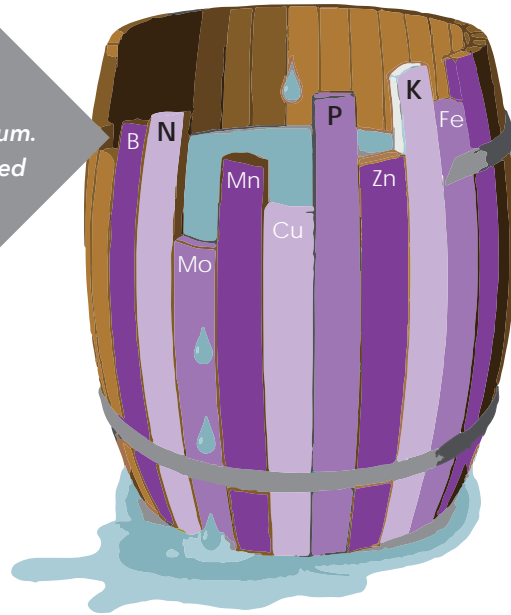


Anvil Ortho 4.8 is an active form of Fe EDDHA with an active ortho/ortho isomer content of 4.8%. It is used for the treatment and prevention of iron chlorosis in a wide range of agricultural and horticultural crops. Applications are particularly important in alkaline and high-calcium content soils where iron is metabolised in the plants development. Anvil Ortho 4.8 gives best results when crops have adequate supplies of major nutrients and water and are not under any stress.



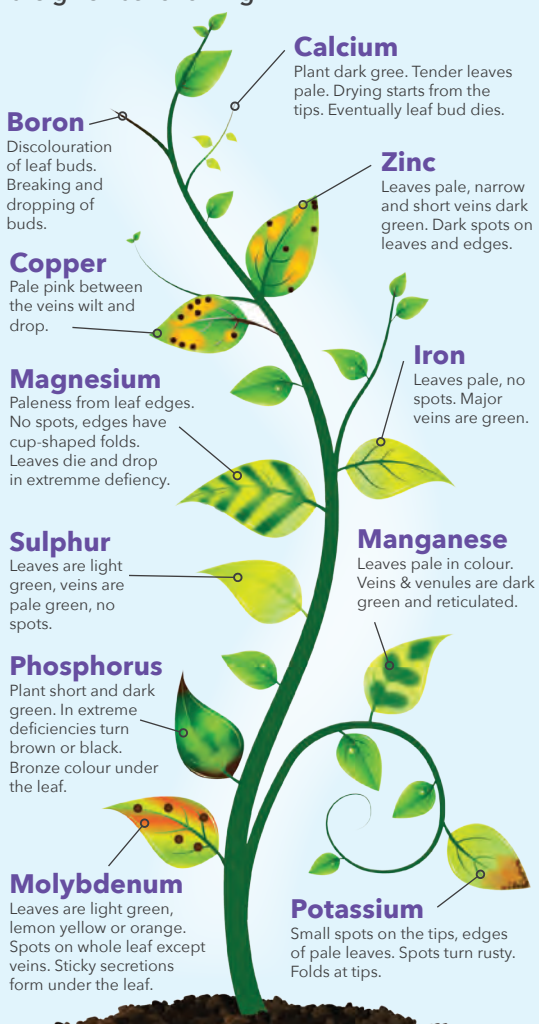
To ensure that none of these deficiencies occur, Anvil Tropical has been formulated to help growers supply the required nutrients whilst meeting Leibig's Law of the Minimum. Leibig found that it was important to increase the most limited required nutrient to allow for plant growth to be improved.

Anvil Tropical, our trace element packaging, includes sulphur, calcium, magnesium, zinc, iron, boron, copper and manganese to help crop growers maintain trace elements levels and minimise the risk of deficiencies to ensure maximum plant and crop growth and ensuring the highest quality yield.



## Deficiency Symptoms for Essential Nutrients

- ▶ Mineral nutrition is required for normal growth and development of plants.
- ▶ On the basis of function minerals are also divided into essential and non-essential.
- ▶ Functions of some essential minerals are given as following:



## ANVIL TROPICAL

### Micronutrient granules

**Analysis (% w/w): 25.0% S, 11.2% CaO, 8.6% MgO, 5.0% Zn, 2.0% Fe, 1.0% B, 1.0% Cu, 1.0% Mn**



### BENEFITS

- Consistent release pattern for reliable performance
- Works well at low temperatures to assist early season growth
- Can be used at any time of the growing season
- Multi deficiency corrector



Anvil Tropical is an easy-to-apply granular, dust free fertiliser in a multi-chelated micronutrient formulation. It helps correct deficiencies of calcium, sulphur, zinc, magnesium, iron and boron in a wide range of crops. Anvil Tropical has been specially developed for the leaching conditions of sandy, tropical soils, where these trace elements are rapidly leached and lost due to heavy irrigation or rainfall, offering an environmentally friendly corrective option. In alkaline and salt-affected soils, the high sulphur content helps to lower the pH level at the root surface to increase both macronutrient and micronutrient uptake.









“ The rapid increase in water consumption in global agriculture has led to an imbalance in water supply and demand. This increases the pressure on water resources and highlights the need for enhanced water use efficiency ”

Wetting agents and water management products have a vital role in agriculture. For the benefit of growers, Indigrow has developed Monsoon, our range of specialist water management products.

Water is vital for agricultural production and plays an important role in meeting the continuing demands of food production. Approximately 20% of cultivated land is irrigated, with the rest being rain-fed. Irrigated agriculture has enabled growers to produce around twice the yield of that of non-irrigated land.

With a growth in population, competition for water will increase, with the need to maximise the water input for agriculture becoming more important to growers, globally.



## The range:

Indigrow's Monsoon range of wetting agents has been formulated to work in conjunction with one another to provide a complete water management solution for the grower and to help them maximise their water use.

Our Monsoon products also take on a further role in water management. By helping to improve water conservation, particularly during periods of drought, our products can help to maintain or improve crop health, quality and yield.



## Monsoon Freeflow - Penetrant Wetting Agent

Water management in agriculture is extremely important to ensure adequate water in the soil profile for efficient nutrient uptake and overall metabolic function.

The balance of moisture plays a key role in reducing abiotic stress and preventing conditions that encourage biotic stress leading to conditions detrimental to crop quality and yield.

The historical build-up of certain surfactant molecules that are not biodegradable in soil profiles has been a concern therefore every effort has been made to prevent this with Monsoon Freeflow.

To that end it has been specifically designed and formulated as a biodegradable penetrant wetting agent with specific surfactant technology to open hydrophobic soil profiles and rapidly reduce excessive surface water.

Penetrant wetting agents, like Monsoon Freeflow, help each water droplet penetrate the soil more easily, helping water to move through the surface layer quickly, and keep the top surface dry.

On hydrophobic soils, water remains on the surface in large droplets which cannot penetrate into the soil profile. Monsoon Freeflow helps to break down the surface tension of these large droplets, so that the water is spread more easily and thinly, allowing it to penetrate the soil profile and work its way through the rootzone.

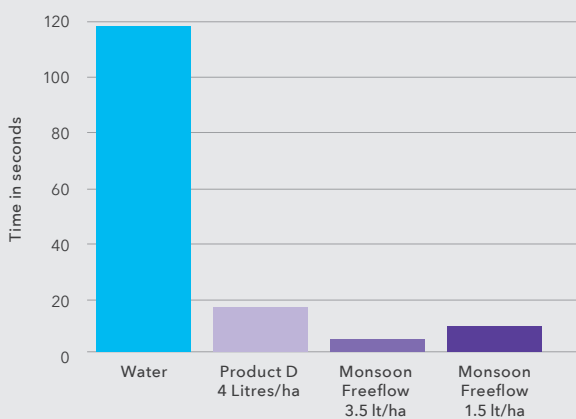


*Trials were undertaken at an independent laboratory to analyse the effectiveness of **Monsoon Freeflow** against a competitor product. The "droplet penetration test" method was used to evaluate the products, which were compared to water.*



The research and development behind surfactant technologies has now provided molecules that are able to reduce the effects of hydrophobic soils to increase wetting and provide rapid even movement of moisture through the profile to prevent puddling and dry patches, particularly important in periods of excess rainfall or drought. Monsoon Freeflow is specifically designed to work as a penetrant wetting agent to encourage even quick water movement through hydrophobic soils.

**Droplet Penetration Test - comparing Monsoon Freeflow with a competitor product**



**Monsoon Freeflow outperformed the competitor product, even at lower than the currently recommended rates of application. Monsoon Freeflow also increases the efficacy of irrigation water movement and enhances spread pattern and penetration of liquid fertilisers.**



## MONSOON FREEFLOW

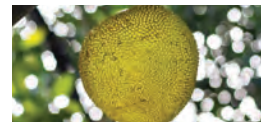
### Penetrant wetting agent

**Analysis:**  
85.0% bio-degradable  
polymeric surfactants



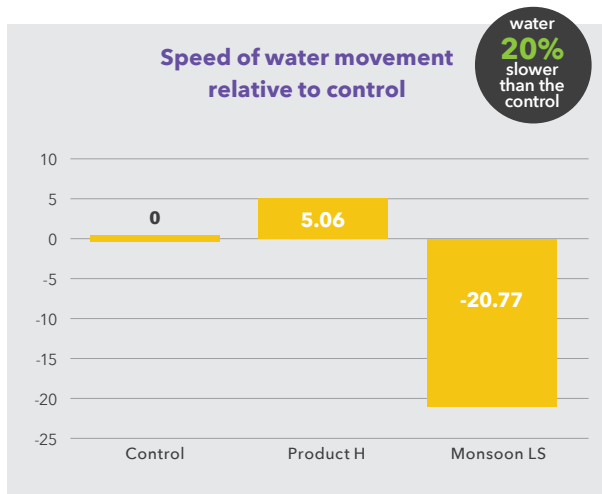
### BENEFITS

- Stimulates faster recovery from drought damage
- Increases fertiliser effectiveness through more uniform application
- Reduces watering requirement, particularly in drought conditions
- A 100% biodegradable, alcohol-free formula

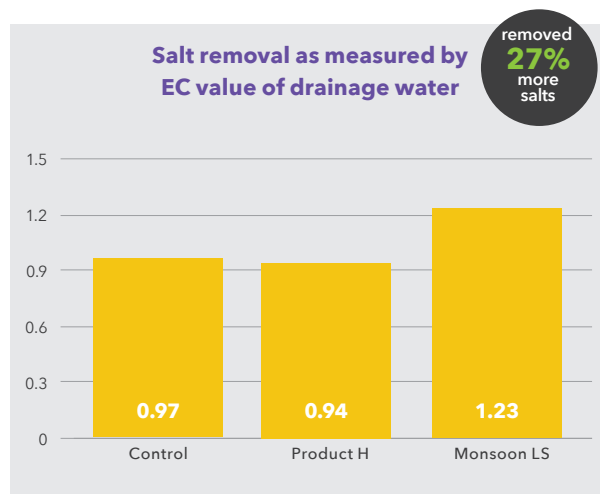


Monsoon Freeflow is a penetrant wetting agent which will pull water into the rootzone faster and maintain moisture levels in the soil profile. It will also remove excess soil surface water, induce deeper rooting and reduce unwanted salts in the root zone. Monsoon Freeflow has wax and retention agents to lower hydrophobic soil properties improving permeation. This specialist soil surfactant provides excellent initial wetting of agricultural soils, enhancing lateral water movement in the soil profile.

Monsoon LS was the most effective in slowing down the passage of water, being 20% slower than the control.



Product H did not remove any more salts over and above that with plain water. Monsoon LS removed 27% more salts.



Recent trials at the University of Lincoln compared another synthetic wetting agent (Product H) against **Monsoon LS**.

Product H is from a major wetting agent manufacturer. Although claims are made for its use as a water management product, it moves water quickly through the profile at a rate 5% quicker than the control.

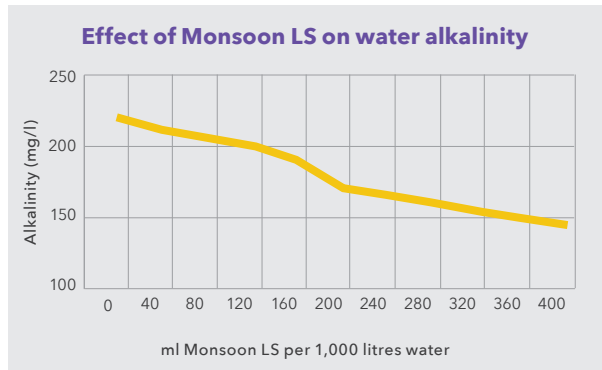
The Electrical Conductivity (EC) of the drainage water was measured to determine if the different treatments removed more total dissolved salts than water alone. The higher the reading the more dissolved salts are removed.



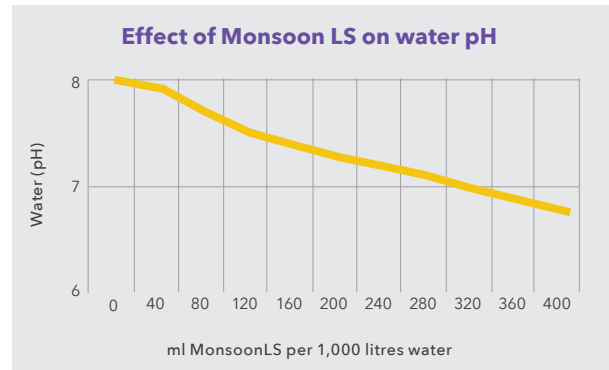


## Irrigation Water Treatment

Due to its naturally occurring low pH value (pH3), Monsoon LS can be used as a treatment for irrigation water. It can be injected directly into the irrigation supply and is safe for use on nylon, metal, PVC or brass pipes and fittings.



Lab tests using Monsoon LS show the significance of adding the product to irrigation water, showing that **higher concentrations of added product reduce both water pH and water alkalinity.**



## MONSOON LS

### Organic water treatment

Analysis (% w/v):  
1.74% CaO, 4.65% SO<sub>3</sub>



Liquid

Soil

### BENEFITS

- Manufactured from a natural and renewable raw material
- Removes all unwanted carbonates and bi-carbonates from poor water sources
- Environmentally friendly and safe for use on all crops
- Acidifies irrigation water and improves water penetration



Monsoon LS is a water treatment product, specifically designed for the treatment of poor quality water sources. It helps to remove all unwanted carbonates and bi-carbonates from the water source. Monsoon LS is an organic alternative to dangerous sulphuric, nitric and phosphoric acids, manufactured from a modified organic acid derived from lignin, a natural and renewable raw material. Monsoon LS acidifies irrigation water, improves water penetration, and helps free up bound nutrients and flush out unwanted salts, particularly in alkaline soils. This environmentally friendly product is safe to handle and poses no risk to crop growth or yield.









**“ Quality and the length of time produce remains fresh and saleable is a critical issue for fruit and vegetable farmers to maximise their return ”**

Over the past few years a number of products have been introduced into programmed applications, primarily to improve the quality of fruits. Starting during vegetative growth magnesium, iron, manganese and zinc build chlorophyll and plant reserves prior to flowering. Boron and zinc play an important role in both flower and vegetative bud development, improving flower set, reducing the early drop of the small fruits and limiting terminal bud necrosis.

As fruit develop correctly balanced nutrition can affect both external (skin) appearance and internal fruit quality. For example, in citrus, potassium applications give a better skin finish guarding against splitting and peel disintegration which is important not only for visual effect but also for transport, storage and shelf-life.

Other elements have different effects: calcium reduces pith breakdown in citrus and bitter pit in apples; boron deficiency reduces calcium uptake, so a balance of nutrients is important. In citrus, boron, iron, manganese and zinc increase total dissolved solids; reduced potassium supply can lead to harder, less juicy fruit segments; in apple, phosphorous improves late season fruit colour.



## Freshlok - Lock in freshness

Calcium (Ca) deficiency although not always visible, will not only affect the cell wall strength but also plant architecture, cell functioning, division, elongation, signalling, enzyme activation and so on as linked with critical cellular functions.

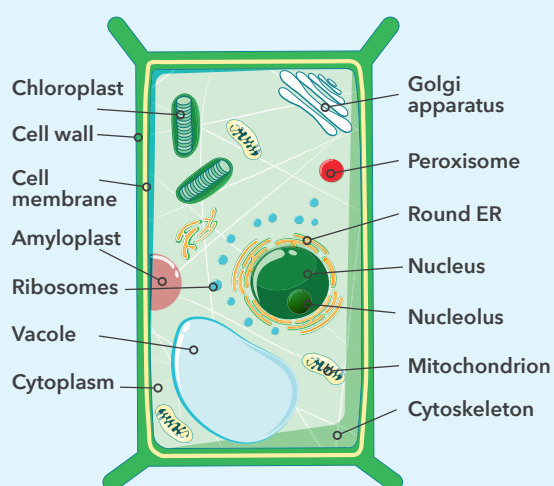
Ca is taken up passively by water movement upwards from roots via the xylem, therefore water solubility is key. Younger parts of the plant receive more calcium through higher water loss (evapotranspiration). Ca is diluted with cell expansion and division.

Calcium is not mobile in high quantity in the tissue therefore a continuous supply is essential. Ca is absorbed through the transcuticular pores (space between cells). It can fulfil the requirement for micronutrients and corrections (less complex than in the soil).

Freshlok is an innovative calcium product containing an integrated patented technology inducing external Ca absorption, internal release from stores and deposition on the cell walls.

The plant cell has approximately 80% of the calcium stored in the vacuole and does not easily release it, and even when released, the calcium will redeposit inside the cells.

### Plant Cell



Freshlok technology triggers the plant's wounding mechanism causing calcium release and inhibits redeposition which is typically within minutes. This release of internal Ca, combined with externally applied Ca, results in increased calcium in the cell wall.

## Grow for success...

Used in a planned approach, starting early season and continuing through to harvest, Indigrow Specialist Products can add significant value to crops and ensure that they reach the high standards that the market place demands for the best prices.

### FRESHLOK

#### Crop quality enhancer

**Analysis (% w/v):**  
15.4 CaO, 0.20 B, 0.05 Cu,  
0.15 Fe, 0.05 Mn, 0.20 Zn



Liquid



Foliar

#### BENEFITS

- Improves quality and yield of the harvests
- Increases shelf-life and storage of the yield
- Prevents and cures from deficiencies of otherwise unavailable calcium
- Maximises tolerance to stress and other plant diseases



FreshLok is a calcium-based formula containing a patented molecule, specific for the prevention and cure of all calcium deficiencies. The patented molecule allows the calcium to be redeployed from the cell vacuoles to the cell walls to reinforce strength and health of both cells and plant. Freshlok helps prevent and cure deficiencies of calcium, leading to improved quality and yield of harvests, longer shelf-life and storage of the crop and increased tolerance to common stresses and other plant diseases.



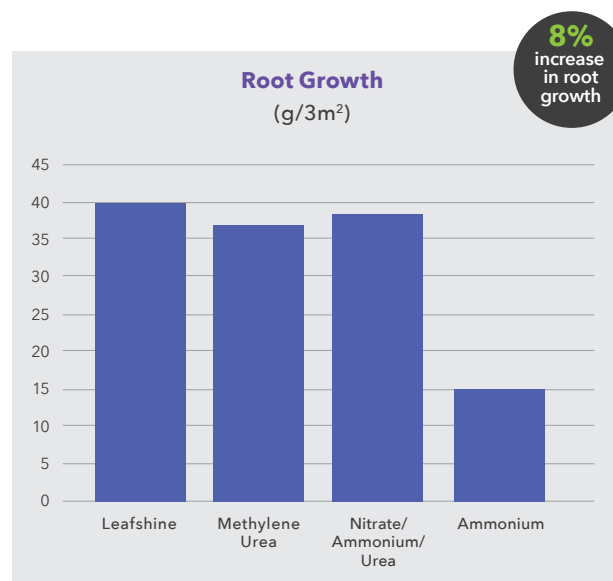
## Leafshine - Improve leaf surfaces

The polymethylene urea source in Leafshine offers a range of benefits to the grower. Leafshine contains a range of nitrogen sources, which offer the plant a consistence and sustained source of nitrogen throughout the growing cycle. The major benefit of this combination of nitrogen sources is a greener and healthier plant. When applied to cut flowers, this results in a significant increase in leaf and foliage colour.

## Increased Root Growth

The low salt-index formulation has been proved to encourage greater root mass, particularly when compared to other nitrogen sources.

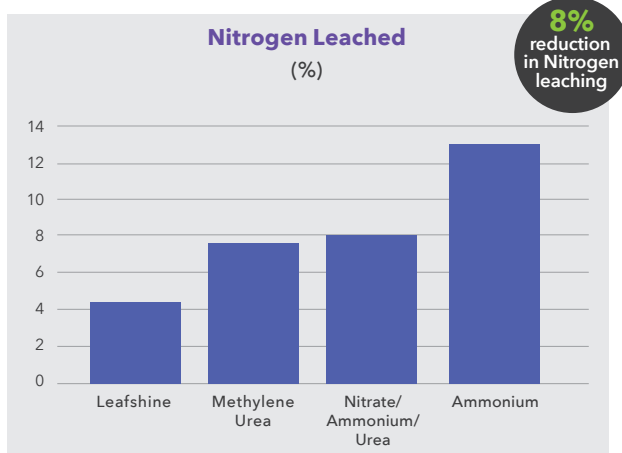
The polymethylene urea nitrogen source in Leafshine was found to produce more than **8%** more root growth than other methylene urea sources.



## Reduced Nitrogen Leaching

Nutrient leaching is an issue for growers. Nitrogen leaching is a naturally occurring process, it occurs when nitrogen leaves the soil in drainage water. Nitrogen is soluble and mobile. It is no problem when it is within the root-zone, but once it gets into the ground water and other fresh water bodies it is an environmental pollutant. Not only could environmental issues occur, but more importantly to the grower, if nitrogen isn't being taken up by the plant the application is being wasted.

The combination of nitrogen sources in Leafshine offers a reduction in nitrogen leaching by over **8%**.



## LEAFSHINE

### Leaf surface improver

Analysis (% w/v):  
**28.0% N**



### BENEFITS

- An innovative leaf surface improver based on polymethylene urea
- Improves leaf colour and shine, particularly in cut flowers
- Reduces drought stress, particularly post planting
- Strengthens leaves of transplants and reduces transpiration loss prior to cutting



LeafShine is a high-quality liquid fertiliser containing polymethylene urea, a slow release form of nitrogen that is very safe for use at generous strength on a wide range of plants. This source provides nitrogen to the crop for up to 12 weeks, ensuring steady, sustained growth without unwanted surges. Applications ensure that leaf colour is rapidly improved, and the foliage takes on an attractive waxed, shiny appearance. An added benefit is that leaves are more resistant to attack from pests and disease.

# crop nutritional guidance

“ Optimising nutrient use efficiency is key to economic produce production. It is important, not only economically, but also environmentally to ensure maximum plant uptake of all applied nutrients ”

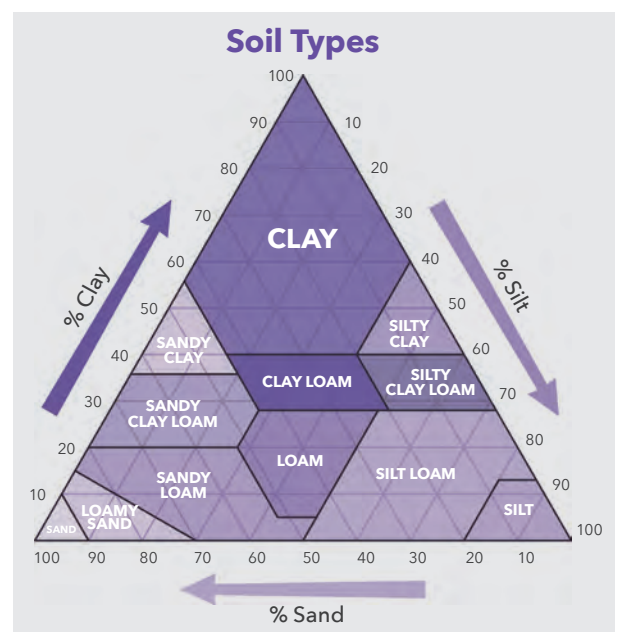
## Nutrient Use Efficiency

Reducing losses, including leaching and volatilisation, from fertiliser usage not only increases crop production efficiency but also reduces the impact on the environment. In order to achieve this growers need to establish several factors in regards to soil, water and crop growth requirements.

## Soil Types

It is important to understand what type of soil you have. Different proportions of clay, sand and silt will affect the amount of fertiliser the soil is able to hold for crop uptake. The higher the clay and organic matter, the more able the soil is to hold on to nutrients and water.

Coarse sandy soils are less able to retain nutrients and water will therefore dry out quicker and will benefit from smaller, more regular nutrient applications.







## Soil Analysis

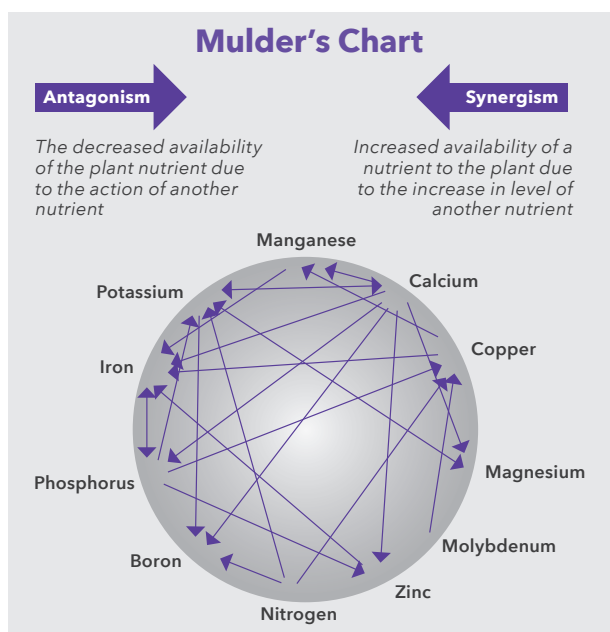
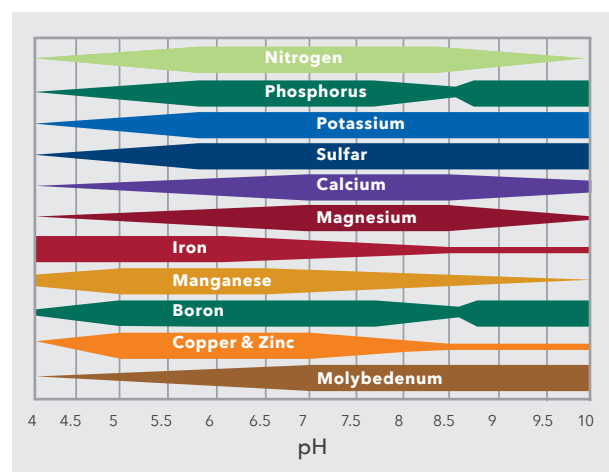
pH is important for nutrient availability. Many acidic (low pH) soils suffer from reduced microbial activity and typically will lock up key nutrients in iron and aluminium complexes. Alkaline (high pH) soils will reduce the availability of a number of elements required for development and economic yield.

## Soil pH

pH is important for nutrient availability. Many acidic (low pH) soils suffer from reduced microbial activity and typically will lock up key nutrients in iron and aluminium complexes. Alkaline (high pH) soils will reduce the availability of a number of elements required for development and economic yield.

In highly alkaline or acidic soils, it is therefore often most appropriate to use foliar nutrients as a direct route to fulfilling requirements and to avoid further potential lock up in the soils.

Different nutrients require different soil pH levels for optimum uptake. Depending on the specific nutrient requirements for individual crop types, different base soil pH levels are required.



Soil pH can be affected by several environmental factors:

- ▶ Rainwater leaches calcium, magnesium, potassium and sodium from the soil
- ▶ Changes in carbon dioxide levels from decomposing organic matter and root respiration
- ▶ The formation of strong organic and inorganic acids from decaying organic matter and the oxidation of high ammonium and sulphur content fertilisers

## Leaf Tissue Analysis

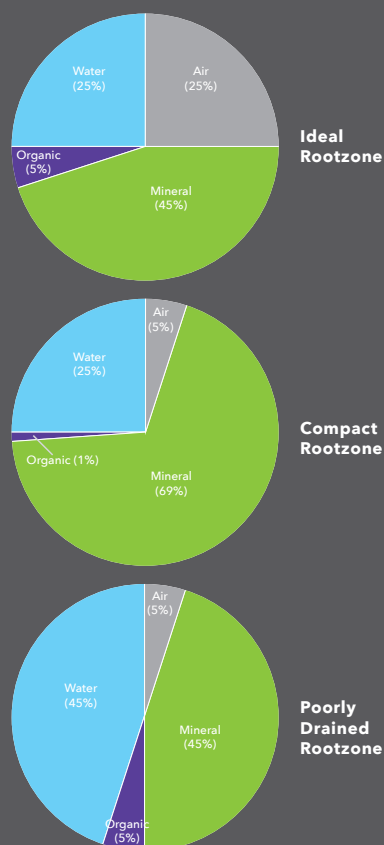
Leaf tissue analysis can identify what level of nutrient are in the plant tissue this in conjunction with the growers historical experience can provide a valuable insight into potential requirements or deficiencies.

### Balanced Rootzones

It is important to remember where in the world you are located, as climate has a huge effect on soil profiles and nutrition levels and requirements.

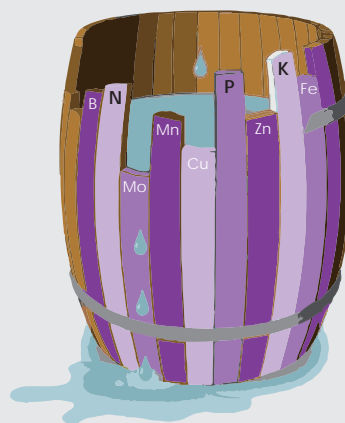
The most important environmental demands for crops are: temperature, moisture, available oxygen, soil pH and available nutrients. Physical analysis allows growers to understand what is going on under the soil's surface, taking into consideration all of these environmental demands. Only after physical analysis is nutrient analysis relevant.

#### *Air, Water Mineral and Organic Balance in Rootzones:*



## Liebig's Law of the Minimum

The law of the minimum highlights the fact that overall growth can be limited by the least available nutrient. This also applies to all the parameters involved in crop growth.



As well as the least available nutrient limiting crop growth and development, other factors can also affect growth and yield:

- ▶ Water holding capacity
- ▶ Buffering capacity
- ▶ Soil structure stability, including drainage and pore size
- ▶ Cation exchange capacity
- ▶ Levels of phyto-hormones

## Electrical Conductivity of Soil

The electrical conductivity (EC) indicates the ability of soil to conduct electrical current due to the presence of salt in a soil solution.

Traditional, EC can be used by scientists and farmers to measure soil salinity. EC can be measured using an electrode. Factors which can affect soil EC include:

- ▶ Pore continuity
- ▶ Water content
- ▶ Salinity level
- ▶ Cation exchange capacity
- ▶ Temperature

Electrical conductivity is measured in deciSiemens per metre (dS/m). For guidance, normal soils should have an EC figure of less than four (< 4 dS/m), and saline soil an EC figure of greater than four (> 4 dS/m).



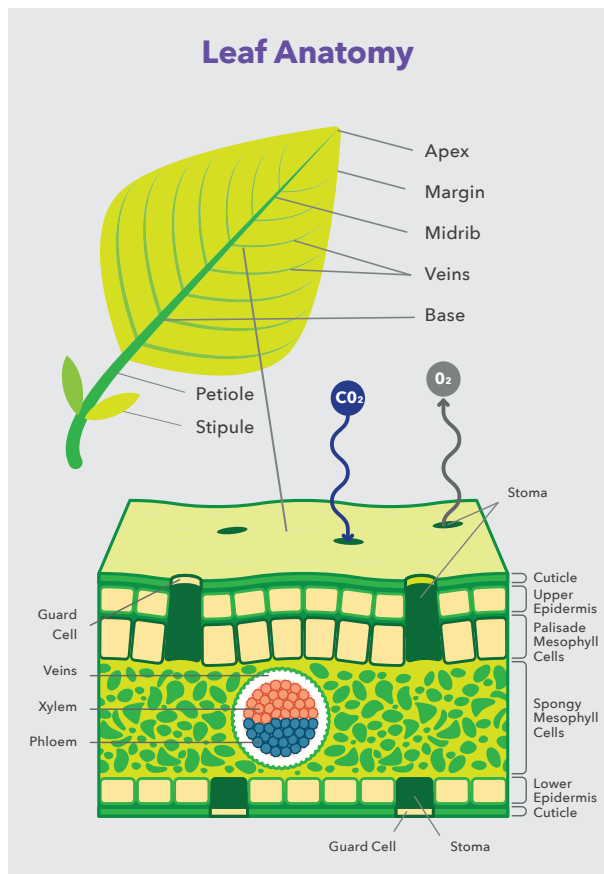
## Applications of Nutrients

Understanding your soil type and pH and challenges they provide will help identify what steps are needed to provide the correct level of nutrients at the optimum timings.

Foliar applications of nutrients is a very effective route to providing rapid fast acting nutrients at times of increased demand by the crop.

All major nutrients N, P, K, Mg, Ca and S can all be applied in lower amounts on a little and often basis throughout critical growth and development stages. This reduces the potential for "hidden hunger in the crop" and prevents deficiency.

Indigrow make every effort to ensure that their products offer the grower maximum available benefit. In order to enhance the efficacy of our products, they contain a range of additional complexing agents to reduce the potential for the nutrients to be oxidised and the inclusion of specially designed surfactants ensures the applied product adheres to the cuticle allowing an even mono-particular layer to increase penetration and adsorption to leaf tissue.



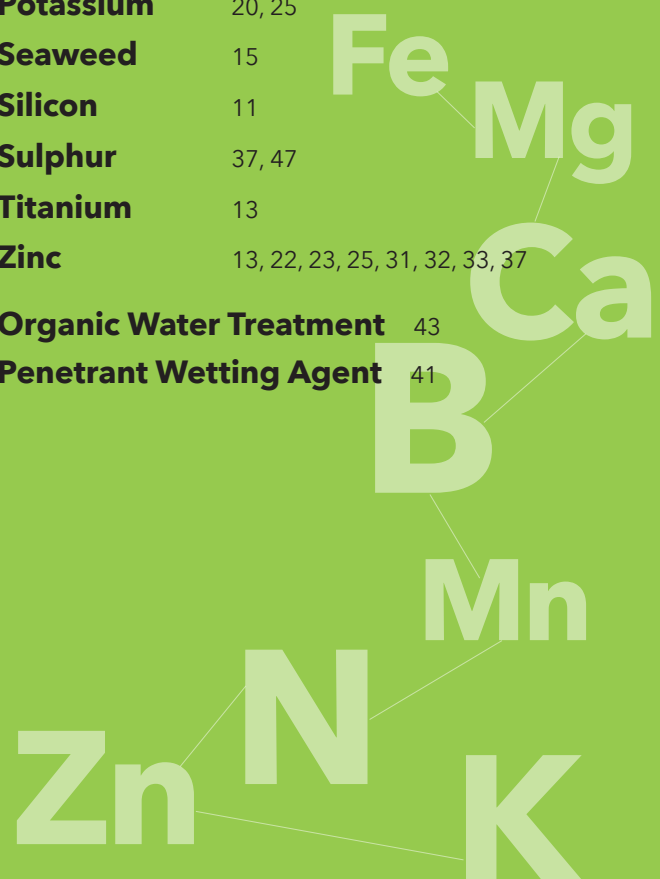
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