Botanova

Elements in our Products

Botanova's advanced, organic, biological Ecklonia Maxima product range enables an increase in marketable yield by using cell disruption technology, cold chain processing protocols, <2% organic stabilisers and 100% of the harvested material.

Environmentally friendly, sound agriculture practises and a focus not only on yield, but also on soil health and adequate nutrient supply, will contribute to long-term sustainability of agriculture and food security. Practices, such as the indiscriminate usage of synthetic fertilisers, in the long term unsustainable, due to its negative impact on all ecosystems. Albeit it is effectively used to sustain and increase yield, it also results in reduced soil quality and increased environmental pollution.

This effect can be reduced through decreasing the application of synthetic fertilisers, an increase in organic fertiliser usage and soil amendment to increase soil health.

All our products contain elements and minerals in varying levels. We do not artificially enrich any of our products and aim to retain all the available bio-actives as they occur in the sourced raw material we process.

Elements contained in our products are further representative of the natural balance of elements that is found in the whole raw material. Although Botanova kelp products have not been formulated as a fertiliser, they contain a high level of natural elements that provides a good basis from which elements can be further added by formulators and farmers that is suitable for their own specific circumstances. Other kelp products, that do not show a similar balance of elements, are very likely to be enriched. Similarly, lower levels of elements, suggests only partial use of the original kelp material.

Global Nitrogen use and the role of Botanova Products

Global nitrogen use is projected to increase by approximately 271% by 2050 compared to the year 2000. To ensure a sustainable future, it is crucial to increase the availability of both organic and inorganic nitrogen sources, while also working to reduce our dependence on synthetic fertilizers.

Our products provide a valuable source of organic nitrogen, supporting a more natural and environmentally friendly approach to nutrient management in agriculture.

1. Nitrogen (N)

Nitrogen is essential for plant growth. It is a key component of amino acids, which in turn forms the building blocks of plant proteins. Nitrogen also facilitates photosynthesis in plants, the process whereby plants use sun energy to change carbon and water into sugar, starches and oxygen, which provides nutrients for the plants to grow.

Nitrogen is also a significant component of nucleic acids such as DNA, the genetic material that allows cells (and eventually whole plants) to grow and reproduce.

A typical element profile, using CropCore Kelp Plus as an example, is reflected here.

ELEMENT	MG/KG
Calcium	51 900
Magnesium	14 800
Potassium	103 900
Natrium	46 623
Sulphur	20 500
Phosphorous	5 000
Iron	464
Manganese	7
Copper	1
Zinc	18
Boron	159
Nitrogen	23 400
Aluminium	608
Nickel	2

Quick Reference Guide:

1. Nitrogen (N)
   - i. Organic
   - ii. Inorganic
   - iii. Synthetic
2. Phosphorous (P)
3. Potassium (K)
4. Calcium (Ca)
5. Carbon (C)
6. Sulphur (S)
7. Sodium (Na)
8. Iron (Fe)
9. Magnesium (Mg)
10. Manganese (Mn)
11. Molybdenum (Mo)
12. Baron (B)
13. Copper (Cu)
14. Cobalt (Co)
15. Zinc (Zn)
16. Iodine (I)
18. Silicon (Si)
19. Heavy metals

A lack of nitrogen results in stunted growth, low protein levels and poor-quality produce. A lack of nitrogen can also be observed through prematurely ageing leaves.

i. Organic Nitrogen

Organic Nitrogen consists of nitrogen atoms bounded with carbon in organic compounds. Organic nitrogen, when applied as a foliar application, is immediately absorbed by plants. Organic nitrogen, suitable for foliar drench as well as ground soak, has proven to require a much lower level of application, than the synthetic alternatives. It is difficult to calculate the direct converted nitrogen requirement. Some indicate that organic fertilisers are used at 20 % of the synthetic counterpart.

ii. Inorganic Nitrogen

Inorganic nitrogen formation is critically dependent on the availability of biological matter in the soil, which in turn stimulates bacteria formation. The lack of inorganic nitrogen in large commercial scale farming systems is mostly due to a deterioration in soil quality, facilitated by unsustainable farming practices, lack of manure and other organic matter in the soil as well as overuse of synthetic fertilisers.

Sustainable future food supply within a global warming and climate change environment, has a critical dependency on good soil quality. Good and healthy soil will reduce leaching of nutrients, increase water retention, increase soil structure and aeration, and increase necessary bacteria and positive nematodes. Sun-dried seaweed has been used for centuries in agriculture to increase soil health, resulting in a sustainable increase in yield.

iii. Synthetic Nitrogen

Synthetic nitrogen is extensively used in commercial farming. It is a manmade product produced by combining nitrogen in the air with hydrogen and methane to produce a synthetic form of ammonia or urea. Synthetic nitrogen is readily water soluble which enables easy uptake by plants. It has played a significant role in the provision of critical food supply on a global level. It has for a long time, also been regarded as a cost-effective medium to sustain agricultural output. However, recent changes resulted in a significant increase in the price of synthetic fertilisers as well as supply being unreliable. Some synthetic fertilisers have increased by 300%.

Lightning separates N particles, enabling it to bond with oxygen, forming nitrate. When it rains, the nitrate enters the soil, which in turn is taken up by plants.

The unnatural release of nutrients in the ocean stimulates the growth of microorganisms, resulting in a decrease of available oxygen. Without sufficient oxygen in the ocean, marine life suffocates resulting in death. It is also responsible for an increase in algal blooms in the ocean. It is also known to limit promoting microbial activity in soil. This results in an increased need for higher levels of nitrogen due to the long term risk of total soil quality depletion which will have a negative impact on yield and an uncontrollable rise in input costs.

The problem we face is not the utilisation of synthetic additions to increase and sustain yield. The actual problem is that the usage of these fertilisers places an even larger responsibility on us to look after our soil and plants through the additional of organic and biological forms of nutrients in order to be sustainable in the long term.

2. Phosphorus (P)

Phosphorus is necessary for plant respiration and photosynthesis, cell division and plant growth. It is vital to produce fruit and seeds and is an important part of proteins, enzymes, and DNA. Sufficient P levels enable early root growth, assist plants to grow in cold temperatures and ensure that plants use water efficiently. It therefore also increases stress tolerance in plants.

More flowers and seeds are also produced, and fruit and grains mature more quickly. Plants are most likely to suffer from phosphorus deficiency when they are grown in compact, poorly aerated soil that is low in organic matter. A deficiency will result in dwarfed and stunted growth. Leaf tips will appear burnt and other leaves may become spotted with necrotic tissue. Most P in fertilisers is mined from phosphate rock, with circa 50 m tonnes per annum mined globally. The P in our products is not artificially enriched and is represented in an organic form.

3. Potassium (K)

Potassium is important for photosynthesis and plant food formation as well as the transportation and storage of plant nutrients. In conjunction with calcium and boron, it is important for the development of plant cell walls. It helps plants resist frost and cold damage. It also controls a plant's ability to cope with drought and helps plants combat disease and insect damage. Potassium regulates the opening and closing of stomata and therefore regulates CO_2 uptake.

Potassium triggers activation of enzymes and is essential to produce Adenosine Triphosphate (ATP), an energy source for many chemical processes taking place in plant tissues. A lack of potassium will decrease crop yield and increase propensity towards stress tolerance. Potassium is naturally found in the Earth's crust and mostly supplied as a mined substance, with circa 70m tonnes of K mined annually.

4. Calcium (Ca)

Calcium is responsible for new cell formation and therefore is required for roots, stems, and leaves to grow. Plants also use it to respond to pests and some diseases. Because it holds the cell walls of plants together, calcium deficiency will show abnormal cell wall formation in roots, shoot tips and new leaves. This essential element for plant growth and development are also critical for plants to increase stress tolerance.

5. Carbon (C)

Carbon is essential for all life on earth. It enables various elements with the ability to bond, such as nitrogen. Carbon is stored in reservoirs such as rocks, the ocean, the atmosphere, plants, soil, and fossil fuels, and it moves between these reservoirs. In the long term, the carbon cycle ensures a balance that prevents the Earth's carbon from either entering the atmosphere or from being stored entirely in rocks. It is this balance that keeps Earth's temperature relatively stable.

It is estimated that the Earth's soil lost 50% of its carbon in recent years, due to the lack of focus on soil health and intense pressure on farmers to increase yield to be financially sustainable. The long-term usage of synthetic fertilisers coupled with an inadequate focus on soil health, is a major contributor to the loss of soil carbon. Soil is the largest carbon reservoir on land and stores carbon in a stabilised form, reducing rising carbon dioxide.

Organic carbon also increases soil structure and provides greater physical stability, thereby providing more porous space for water to enter. It assists with the storing of oxygen in the soil (aeration) and as well as water drainage and retention. This results in reduced nutrient leaching which in turn reduces the input costs of fertilisation. Carbon is also essential for microbial soil activity. Being able to farm in healthy soil, a farmer can expect yield improvements and an increase in long term profitability.

6. Sulphur (S)

Sulphur along with calcium and magnesium is one of the three secondary nutrients required by plants for normal, healthy growth. Sulphur is required for the formation of plant proteins and certain hormones. It also reduces the sodium content in the soil which is well balanced with the natural sodium content in kelp. A deficiency will result in delayed plant maturity, stunted growth, and chlorosis.

7. Sodium (Na)

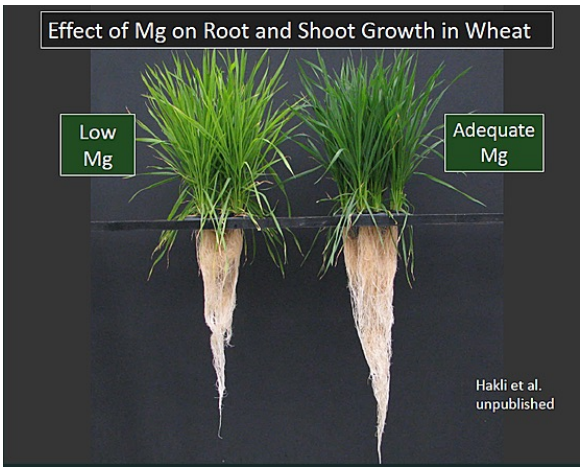
Sodium assists in the metabolism and synthesis of chlorophyll. It can also act as partial replacement for potassium in certain plants and aids in the opening and closing of stomates, which regulates internal water balance.

8. Iron (Fe)

Iron is important for the development and function of chlorophyll, enzymes and proteins. It also plays a role in respiration, nitrogen fixation, energy transfer and metabolism. Chlorosis on young leaves is a symptom of iron deficiency.

9. Magnesium (Mg)

Magnesium is very important for photosynthesis. It is also a component of many plant enzymes and aids their function. Magnesium helps to move phosphorus within the plant to where it is needed and enables the plant to use iron. A deficiency will cause chlorosis and necrotic spots in older leaves. It will also reduce the plant's root growth overall resulting in reduced plant mass.



10. Manganese (Mn)

Manganese is used in photosynthesis, synthesis of chlorophyll and nitrogen absorption as well as the synthesis of riboflavin, ascorbic acid, and carotene. Deficiencies will result in chlorosis of new leaves, necrotic spots, and irregularly shaped leaves.

11. Molybdenum (Mo)

Molybdenum is important for nitrogen metabolism. It also plays an essential role in the use of phosphorus within plants. Without molybdenum, plants may be able to take up inorganic phosphorus, but adequate molybdenum is required for plants to convert the phosphorous into an organic form that they can use.

Molybdenum deficiency stunts plant growth and plants may have an inability to use nitrogen properly. Leaves may show spots of chlorosis between the veins and along the edges. Ultimately the edges of the leaves may turn brown and die. The pollen of molybdenum deficient plants will usually be less viable, so grain and fruit production are often reduced.

12. Boron (B)

Boron is required for cell division and tissue development of shoots and roots. It also aids seed production and fruit formation. Because it is a requirement for healthy cell structures, boron deficient plants break down prematurely resulting in brown flecks, necrotic spots and corky areas in fruit and tubers.

13. Copper (Cu)

Copper facilitates respiration, photosynthesis and is also important for plant metabolism. It is a component of a variety of enzymes and plant cell walls - thus it is important for plant strength. Copper also affects the flavour, sugar content and storage life of fruit. Copper deficiency can result in poor growth, delayed flowering and sterility or poor germination. It can also result in chlorosis.

14. Cobalt (Co)

Cobalt should only be available as a trace element in plants. It does increase drought resistance and is, therefore important in increasing plant stress tolerance. It also plays a role in the production of ethylene. Cobalt deficiency results in reduced seed germination in dry conditions and reduced plant growth.

15. Zinc (Zn)

Zinc is important to produce plant growth hormones and proteins and is involved in sugar consumption. Good root development, as well as carbohydrate and chlorophyll formation, is also dependent on zinc. It assists plants to be more resilient against biotic and abiotic stressors. Zinc deficiency can result in chlorosis and stunted leaves as well as lowered stress tolerance, especially with exposure to low temperatures.

16. Iodine (I)

Iodine plays an important role in antioxidant metabolism of plant species. In the presence of iodine, crops have shown increased antioxidant levels. It is also essential in humans for thyroid metabolism, development of cognitive abilities and is associated with lower risks of developing certain types of cancer in people. Various projects are initiated by governments globally to bio-fortify crops to increase iodine supply for the general population. Approximately 1.5 billion people worldwide suffer from severe iodine deficiency.

17. Silicon

Silicon is the most abundant element in Earth's crust. Although not an essential element for some plants, it has a positive impact on overall growth in a wide variety of different crops. It has also shown that it alleviates the toxic effect of abiotic stress.

Runoff from synthetic fertilizers can significantly harm the environment. It can contaminate water, impact on the aquatic eco system and also contribute to air and soil pollution.

Botanova Product Range

Crop Core Kelp diluted concentrations are applied to enable different markets and different commercial farmers to choose the dilution that suits them best. Having a very high viscosity, it provides flexibility to evaluate spraying and blending equipment relative to the dilutions available.

CropCore Kelp PLUS

Dilution: 1.4 ml/litre water

Suitable for blenders who have commercial blending equipment available and would use this product as an input ingredient in their own formulations.

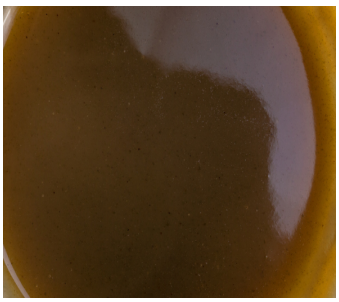
Registration number: M486

CropCore Kelp ESSENCE

Dilution: 2 ml/litre water

Suitable for commercial farmers who have filters between tanks and sprayers and have blending equipment that can agitate sufficiently to disperse the product with water.

Registration number: M485



Kelpure CUSTOM BLEND

Dilution: 2ml-4 ml/litre water

Suitable for commercial farmers who needs a flowing product that is easy to dilute in water, prior to application.

Custom Blend

Minimum Processed Products.

Maxima Dry

Maxima Dry

>5mm< 20mm CHIPS

<5 mm FINES

<400 micron POWDER

Our product range is designed to meet the specific needs of industries and processors by offering kelp in three distinct dry particle sizes to suit various applications. The majority of our kelp is exported to China for alginate extraction.

Maxima Wet

Maxima Mince

20 kg Buckets **200 kg Drums**

Our Ecklonia Maxima Mince is freshly harvested and stabilised with organic preservatives and stabilisers. This product is ideal for formulators and blenders who want to bring their own kelp products to market. It is an excellent product for local use as well as export markets.

Botanova

Sales: Global and national in South Africa through selected, appointed distributors.

Contact: Luke ten Oever | luke@encryptic.co.za | +27 76 941 3913 & Roger Tyler | Roger@encryptic.co.za | +27 83 235 6219

Manufacturing address: Oceanic Junction (Pty) Limited | 1 Red Square | Lekkerwater Street | Sunnydale | 7975

Registration holder: Encryptic (Pty) Limited

V1_260825