HumiMax *Why*

- Derived from naturally refined micronised 100% Leonardite without the use of chemicals or alkaline hydrolysis, HumiMax maintains all the natural benefits of the raw material including the natural pH 4.2.
- Natural chelate and synergistic carrier of fertilisers, specifically formulated into a micronised (6 µm) suspension to increase penetration of nutrition into leaves resulting in;
  - ✓ **Reduced** application rates.
  - ✓ **Greater** efficiency of uptake.
  - ✓ **Improved** metabolisation.
  - ✓ **Increased** stimulation of roots, shoots and plant defence.
  - ✓ **Reduced** nutrient input requirement.
- Large open molecules of the humates in HumiMax occupy a large volume of space with a low density.
- Large open molecules are slowly fragmented into smaller molecules in the soil meaning;
  - o **There is both an instant effect, and a slow release effect, due to the continuous improvement over time as these molecules accumulate in soils.**

HumiMax *Will*

- **HumiMax will** support the natural soil processes of nutrient cycling and biological processing, by formulating soluble organic complexes in the soil solution. Complexes which assist nutrient availability and uptake by soil biology and plants within the rhizosphere. Directly supporting;
  - Diverse soil biology populations.
  - Healthy plant root and shoot development.
  - Natural plant defences.
- Improve soil structure by increasing flocculation of clay particles through protective colloidal action as a result of the negative charge of the humate molecules present within HumiMax. Actively;
  - Increasing soil porosity for a more balanced air water ratio.
  - Supporting a healthy soil ecosystem and plant processes.
- Increase the nutrient bank (Cation Exchange Capacity) in the soil by increasing cation exchange sites due to the negative charges of humates attracting positively charged cations.
- Bind insoluble metal ions, oxides and hydroxides to make them slowly available to plant roots.
- Stabilise toxic substance molecules and assist their bacterial degradation.
- Buffer plants from excess sodium in the soil by positively interacting with the molecular charges between sodium cations and soil particles.
- Once in the leaf, the humates in HumiMax will be metabolised into simpler plant acids, leading to an immediate biostimulant effect.
- Increase uptake efficiency of fertiliser leading to a reduction in overall inputs due to;
  - The natural chelating properties and enhanced leaf penetration efficiency retained by the pressure extracted humates.
  - The uniform distribution across leaf surfaces because of the micronised suspension technology.
- **Hasten the establishment of newly sown areas by stimulating nutrient uptake within the plant and providing a source of polyphenols, which catalyse plant function, intensifying cell division and consequently increasing root and shoot development.**

HumiMax *How*

Application Period

J	F	M	A	M	J	J	A	S	O	N	D
•	•	•	•	•	•	•	•	•	•	•	•

Application Rates

As a Biostimulant					
Frequency	4-6 weeks	Rate	6-10 L/ha	Volume	300-600 L/ha
As a Fertiliser Adjuvant					
Frequency	As required	Rate	50 ml	per	100 L of tank volume
Particularly suitable for tank mixing with.		• Fertilisers notably urea • Seaweed			

Product Analysis

COMPONENT	% w/w	Use
Deionised water	58%	Dispersion media
Leonardite	40%	Active ingredient
Dispersing agents	2%	Dispersion media
Ingredient	% w/w	g/L
Total Humates	25.0%	285 g/L
of which		
Humic Acid	20.5%	234 g/L
Fulvic Acid	4.5%	51 g/L

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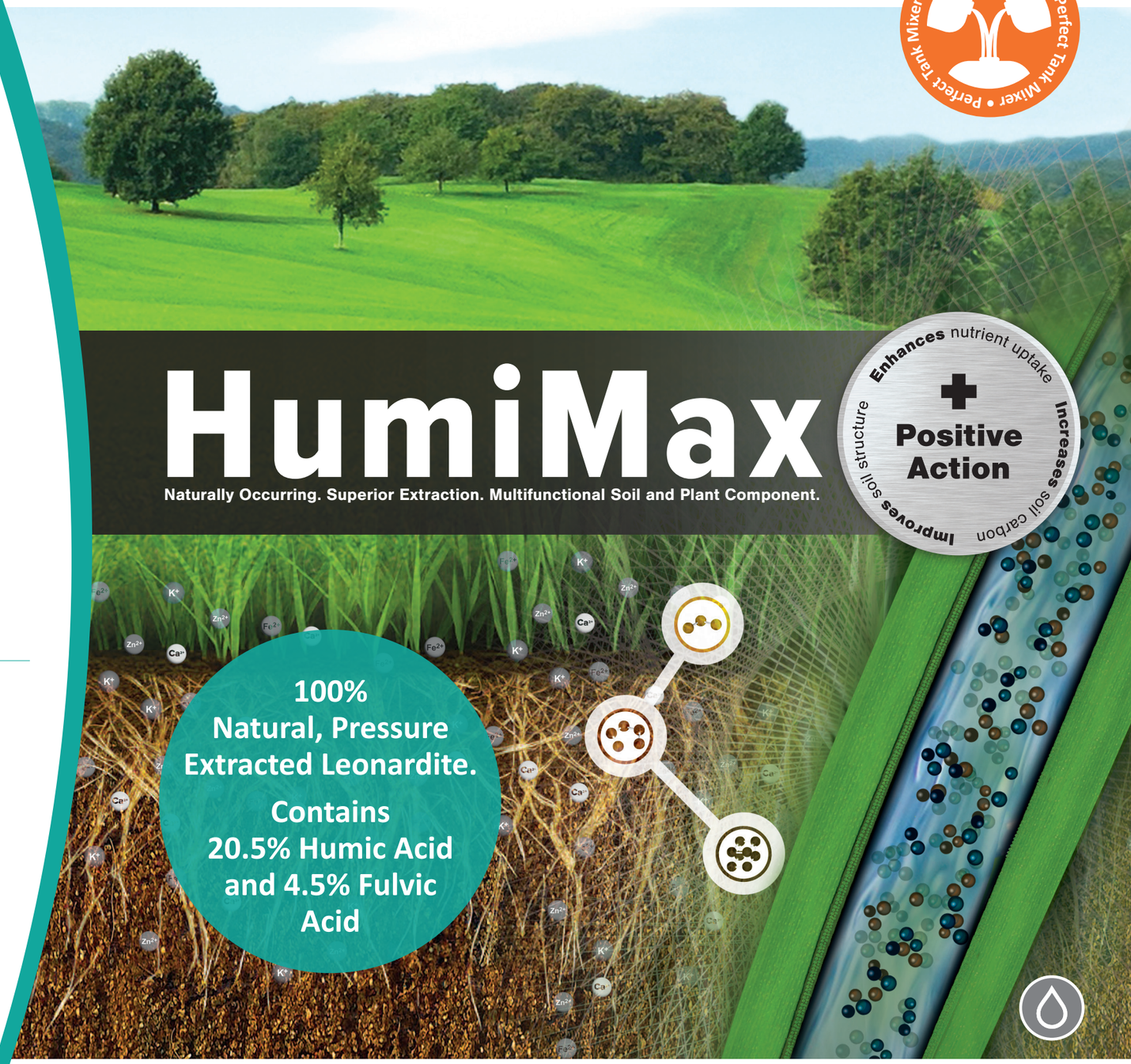


IMPROVES ABSORPTION & RETENTION OF APPLIED NUTRITION

Lifting the Lid *on Humus*

Leonardite

Leonardite is a naturally occurring, oxidised mineral, derived from concentrated humified plant deposits.

Leonardite is rich in organic substances essential for the healthy function of soil structure, soil biology and plants.

These organic substances are known to be depleted in many top soils, growing media and sports turf profiles.

Humus

Humus is the remaining part of humification, the process of microbes decomposing organic matter in the soil. Humus forms a stable component of organic matter present in soils. Humus performs many vital functions within the soil complex, it interacts positively with soil particles, soil nutrients, soil biology and plants.

Humus drives the naturally evolved functions and interactions between all of the fundamental constituents and processes of an efficient and healthy soil biosphere.

Increasingly sports turf managers at all levels, are understanding that respecting and nurturing these processes is a key component in the successful production of high quality sustainable turf surfaces.

Humates

Humus is formed of various complex organic components, referred to collectively as humates.

The major humates *are...*

Fulvic Acids - Small complex molecules and the fraction of humus soluble in water.

Fulvic acids are highly biologically active due to their small molecular weight. This allows fulvic acid to dissolve minerals and elements into its structure, at which point they are referred to as mobilised fulvic complexes. These natural complexes are then in a form which easily interacts with, and is absorbed by living plant tissue. Fulvic acid is nature's method of chelating metallic minerals into a bioavailable form. Fulvic acids also capture and transport a range of plant substances such as vitamins, amino acids, auxins, enzymes and hormones.

Humic Acids - Complex molecules larger than fulvic acids. A fraction of humus not soluble in water.

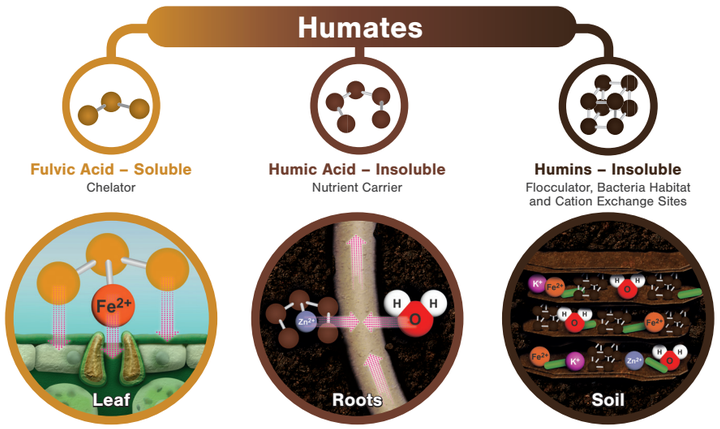
Humic acid acts as a major carrier of nutrients into plant roots via a transfer mechanism which operates as the plant absorbs water. The negative charge of a humic acid molecule attracts and bonds with positively charged nutrients (cations) in the soil. The bonded molecules are then transported with water towards the roots and into the plant. Hydrogen, Oxygen and Carbon are the most abundant elements present within a plant's body, they are sourced via photosynthesis and water. When absorbed by plants, the organic structure of humic acid molecules has been shown to mobilise hydrogen and activate oxygen, which in turn drives core plant processes. Humic acid also provides a supplementary carbon source for plants and soil biology which drives balanced, increased nutrient processing and uptake within the rhizosphere.

Humins - Closely associated with humic acids, a fraction of humus not soluble in water.

Humin molecules represent stable carbohydrate like materials which form an aggregate component within the soil. Humins attract nutrients and organic molecules otherwise strongly bound to soil particles, and provide a site for soil microorganisms to process them via enzymes into forms which then serve to further nourish other soil life and plants.

Rhizosphere...

...the highly active narrow region of soil adjacent to plant roots where the majority of plant nutrient cycling, disease suppression, symbiotic function and microbial interactions take place.



*Each humate compound **plays a vital role in healthy soil life** and **plant function**. In a healthy functioning natural soil, **humates occupy up to 50% of the soil organic matter complex**.*

Molecular structures for illustrative purposes only. Solubility within water.

I am always looking for products which help improve the health of the grass plant, without the overuse of chemicals and fertilisers.

This fits with our long-term plan of being chemical free.

After finding BioMass Sugar and its beneficial effects I was introduced to HumiMax.

The Addition of HumiMax to our plan has assisted in keeping the grass plant healthy and has meant our inputs have remained low while producing good playing surfaces.

Jamie Blake
Course Manager| Broadway Golf Club

HumiMax *Technically Superior*

Pressure Extraction

Pressure Extraction NOT Chemical Alkaline Hydrolysis Extraction – HumiMax contains humic acid which is actually…an acid.

The traditional methods of extracting humic acid from Leonardite use strong alkaline chemicals to release the humic acid component.

This process has the side effect of raising the pH of the humic acid component, to the point where it no longer remains in its natural mildly acidic form, instead it becomes an alkaline substance.

This alteration in the natural properties of the humic acid has the detrimental side effect of causing humic acids extracted by chemical alkaline hydrolysis to gel and precipitate out of solution when they are tank mixed with many fertilisers and Plant Protection Products (PPPs).

Chemical alkaline hydrolysis extraction also reduces the natural ability of these humic acids to interact with plant tissues in the most efficient manner.

HumiMax is different, HumiMax is pressure extracted to retain the natural physiochemical properties from raw 100% Leonardite, eliminating chemical shock and retaining humic acids natural pH 4.2 which;

- **Prevents** precipitation and gelling with fertilisers and the deactivation of plant protection products within convienience tank mixes.
- **Increases** permeability of plant cell walls leading to safe and rapid penetration of the leaf cuticle by fertilisers.
- **Facilitates** increased nutrient uptake and efficiency.

Micronised Suspension Technology

Micronised Suspension Technology – Milled from 100% Leonardite

HumiMax is micronised from pure Leonardite down to 6 microns (µm) which is up to four times smaller than similar products. This micronised effect serves two major advantages;

- Eliminates nozzle blocking.
- Results in a lamination effect over leaf surfaces.

The lamination effect results in a greater more even coverage over the surface area of the plant leaf.

This increased surface area coverage contrasts against the globular, clustered effect of larger particles in other similar products, resulting in greater uptake efficiency of fertilisers.

It is this lamination effect, combined with greater uptake efficiency, which facilitates lower application rates of HumiMax itself and tank mixed fertilisers.

A triple combination of the retained natural pH 4.2, the Micronised Suspension Technology and the existing natural benefits of humates are what give HumiMax the edge when it comes to optimising the natural benefits of humates for improved soil structure, soil biology, plant function and nutrient cycling efficiency. Making it the perfect partner for tank mixing with a range of foliar inputs.

Research trials have demonstrated

- **Up to 10% reduction in nitrogen when used with granular fertiliser.**
- **Up to 30% reduction in nitrogen when used with foliar fertiliser.**

X40 magnification of the advantageous HumiMax lamination effect, resulting from of the 6 mµ suspension concentrate (SC) formulation.