UNLOCK YOUR SOIL'S POTENTIAL WITH K-HUMATE® 26

Highly Concentrated Liquid Humate

- Improves soil moisture and nutrient retention
- Reduces nutrient lock-up in the soil
- Improves soil structure
- Stimulates plant root growth and soil biological activity

+1 800 760-8402
omniausa.org

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WHAT ARE HUMIC ACIDS?

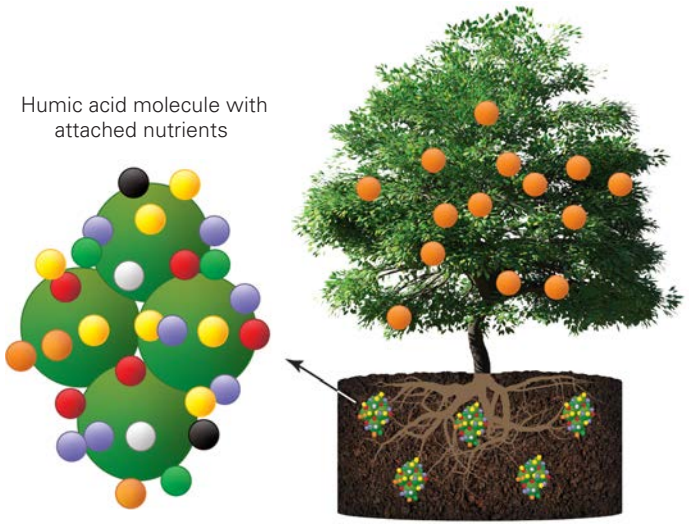
Humic acids are naturally derived from the breakdown of plant and microbial matter. Humic acids are the foundation of all fertile soils. Over the years, these humic acids accumulate in the soil. This provides the soil with greater nutrient retention, water holding capacity, readily available carbon food source for beneficial soil microorganisms and better soil structure. This is nature's way of minimizing nutrient losses to maintain long-term soil fertility and to ensure sustainable plant growth.

Humic acids present in the soil hold a wide range of micronutrients and macronutrients around plant roots. This provides all the essential nutrients for quick root uptake and optimum plant growth. Humic acids also improve the wetting ability and water holding capacity of the soil.

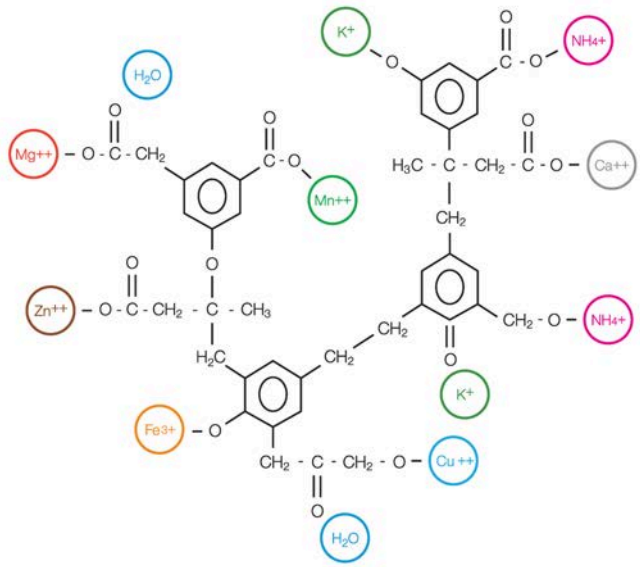
WHAT IS K-HUMATE® 26?

K-HUMATE® 26 is a highly concentrated source of humic acid sourced and produced in Australia. The product's high quality and proven performance is now well recognized all over the world.

K-HUMATE® 26 provides a helping hand to growers to achieve greater crop production through a more effective use of applied fertilizers and maintaining long-term soil fertility.



K-HUMATE® 26 holds onto a wide range of nutrients from applied fertilizers in the soil until plants are ready to use them. **K-HUMATE® 26** also helps unlock bound nutrients in the soil, making them available to the plants.



Humic acids are very effective in chelating many plant nutrients and more importantly, in retaining water (see illustration above). This enables humic acids to retain a wide range of nutrients, all in close proximity to plant roots to provide more balanced nutrients for growth.

BENEFITS OF USING K-HUMATE® 26

Biological

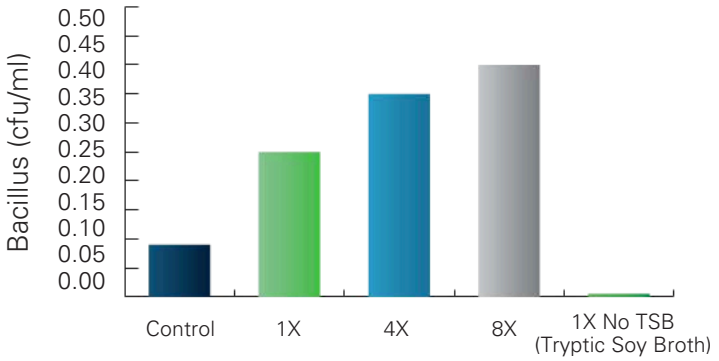
- Provides a readily available source of carbon for the growth of soil microorganisms.
- Improves roots development for an increased resistance to biotic and abiotic stress conditions.

Chemical

- Improves the soil chelation properties by reducing nutrient loss due to leaching and run-off.
- Releases soil-bound nutrients, particularly phosphorus and calcium.
- Locks-up aluminum in acidic soils which is harmful to plant growth.
- Improves the soil buffering capacity which leads to the stabilization against pH changes.

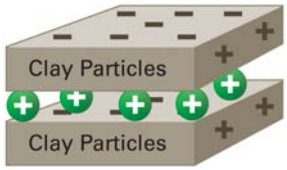
Physical

- Promotes soil aggregation and creates better soil structure facilitating improved root penetration enabling better access to available minerals and nutrients.
- Opens up heavy clays and compacted soils.
- Improves soil wetting capability which reduces surface soil crusting and improves water penetration and retention in soils.

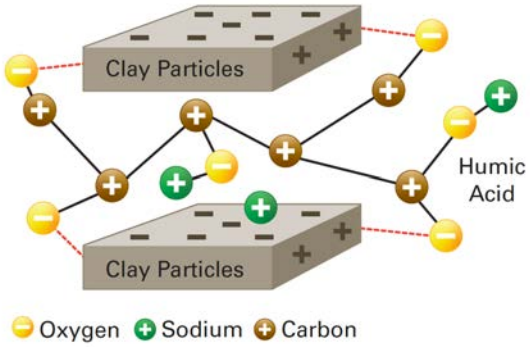


Humic acids promote beneficial soil microbial growth by providing active carbon for their energy and biomass requirements. Recent studies have shown that the addition of K-HUMATE® 26 significantly stimulated growth of *Bacillus* spp in vitro. *Bacillus* are one of the most important groups of bacteria that work with the plant to enhance growth.

Poor Clay Soil: Compact, hard and impenetrable to roots, water and nutrients



Good Clay Soil: Open, friable and penetrable to roots, water and nutrients



K-HUMATE® 26 rejuvenates heavy clays which are compact and impenetrable to water and nutrients. When soils dry out, water is removed from between the clay particles, causing them to move very close together, shrink in volume and form cracks in the ground. This cracking in the ground is a common feature in clay soils which are poor or lack of organic matter. Humic acids in nature interact with the clay particles and prevent them from sticking closely together when they dry out in the summer. The more open clay structures the higher is the water retention for plant use.

IMPROVING GROWING CONDITIONS

SOIL MOISTURE

Humic acids, like most forms of plant organic matter, improves the water holding capacity of most soils. In sandy soils, humic acids form a hydrophilic (water-attracting) coating on the sand particles which increases their wetting ability and moisture retention properties. In clays, humic acids open up the clay structures to enable greater water penetration and retention.

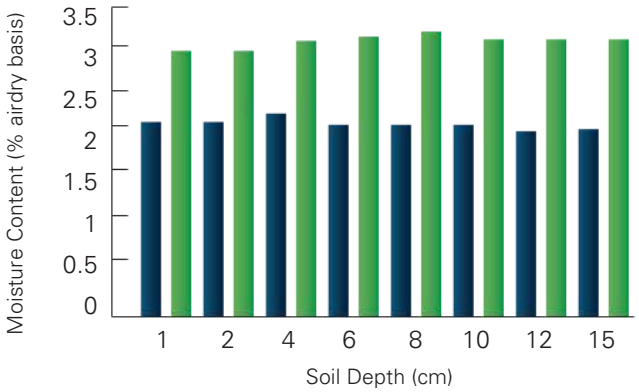
Better soil wetting ability and greater soil penetration reduces water losses from run-off and drainage and improved water usage and reduction in labor requirement and costs.

NUTRIENT RETENTION AND AVAILABILITY TO PLANTS

Soil organic matter (humus) has a great ability to hold nutrients in the soil until they are required by plants.

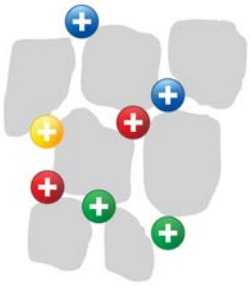
It is the humic acid molecules in the humus which hold most of the nutrients from applied fertilizers.

K-HUMATE® 26, which has a cation exchange capacity of 1900 meq/100g (1900 cmolc/kg), greatly improves the ability of sandy soils to hold many essential nutrients such as ammonium, potassium, calcium, magnesium and the trace elements.



A compact, acidic brown-grey clay loam topsoil, with very low organic matter, was much easier to wet after treatments with water containing less than 0.25% K-HUMATE® 26. The soil treated with K-HUMATE® 26 was also found to retain up to 50% more water than the untreated soils.

CATION EXCHANGE PROPERTIES



Uncharged surface of sand particles cannot hold nutrients

Coating of humate provides charged surface to hold nutrients

Large amounts of nutrients not held in the soil and lost to leaching

More nutrients held in soil and not lost to leaching

Ca, Mg, K, Zn, Cu, Mn, Fe, B

Humic acids, which are trapped in cracks and pores and adhered to the surfaces of sand particles, hold onto many important nutrients which would have otherwise been lost to leaching.

IMPROVING CROP QUALITY AND YIELD

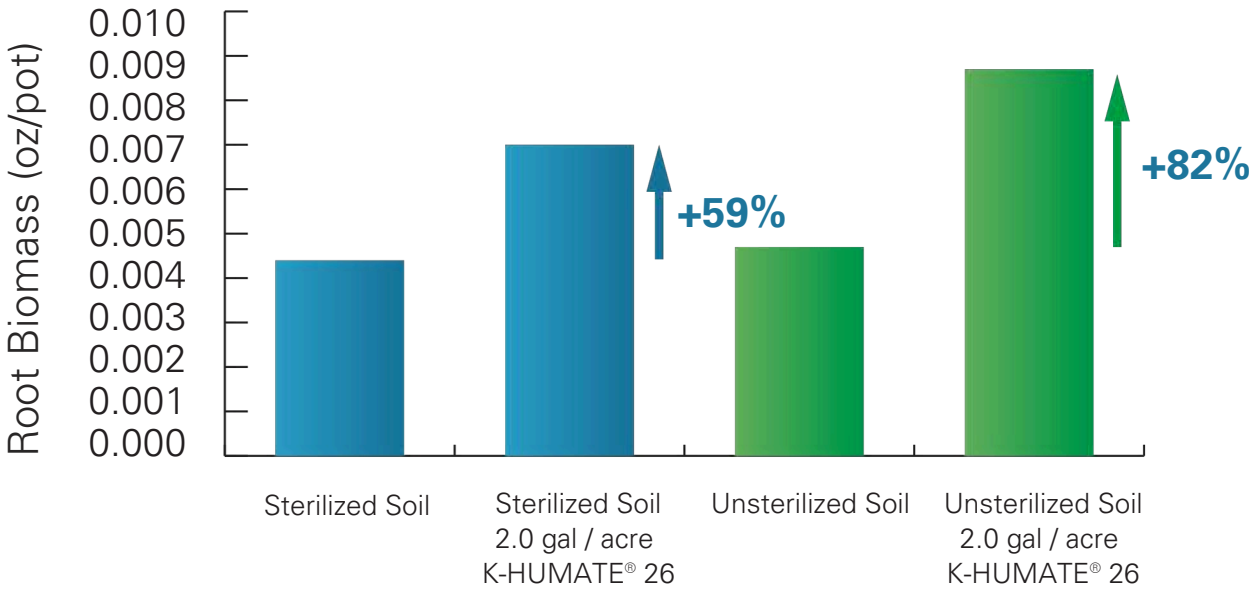
SUSTAINING BALANCED NUTRITION

The saying goes, "You are what you eat". Similarly, the well-being of plants depends not only on what you feed your plants, but also on the availability of the nutrients in applied fertilizers and how successfully the plants are able to take these nutrients through their root system and foliar.

Scientific studies have shown that a large proportion of your fertilizers are locked-up in the soil soon after application, particularly phosphorus.

K-HUMATE® 26 can improve the solubility of the bound phosphates in the soil by decreasing phosphorus fixation. It also enhances soil microbial activity that releases phosphorus. K-HUMATE® 26 stimulates greater root growth in seedlings and mature plants resulting in higher nutrient uptake in plants and a greater ability to tolerate extended dry spells between irrigations or rainfall. A more extensive root system growth promotes greater plant vigor and better crop yield and quality.

DRY ROOT BIOMASS OF WHEAT IN STERILIZED AND UNSTERILIZED SOIL WITH AND WITHOUT K-HUMATE® 26



K-HUMATE® 26 works with the biology of the soil to increase root biomass, and consequent nutrient uptake. 2.0 gal / acre of K-HUMATE® 26 increased root biomass in wheat by 59% where the soil was sterilized, and 82% in unsterilized soil, showing the interaction with soil microbes. The increased root mass has been also recorded in a wide variety of crops including potatoes, citrus, tomatoes and corn.

SYNERGISTIC BENEFITS OF HUMIC ACID AND CALCIUM

Humic acid is often considered incompatible with calcium due to the chemical interactions between them that may lead to precipitation. Optimizing the use of humic acids and calcium in agricultural practices while balancing their application can help maximize their benefits and minimize the potential conflicts. The synergistic benefits of using humic acids and calcium includes:

Enhanced Calcium Uptake:

Humic acid can chelate calcium ions, keeping them in a plant-available form and preventing them from becoming insoluble. This enhances calcium availability and uptake by plant roots.

Improved Soil Health:

The combination of humic acid improving soil structure and microbial activity, along with calcium's role in neutralizing soil acidity and strengthening plant cells, results in overall healthier soil and plants.

Stress Mitigation:

Both humic acid and calcium improve plant resilience to environmental stressors. Humic acid enhances drought tolerance and nutrient uptake, while calcium strengthens cell walls and supports metabolic processes.

Boosted Plant Growth:

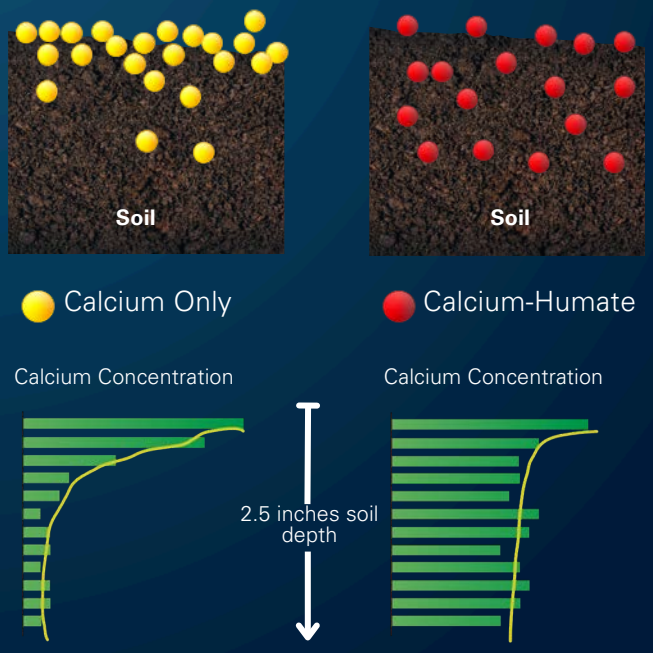
The synergistic effect of humic acid promoting root growth and nutrient uptake, combined with calcium's role in cell structure and function, leads to more robust and healthy plant growth.

In summary, humic acid and calcium together create a powerful combination that enhances soil quality, nutrient availability, and overall plant health, leading to better crop yields and sustainability in agricultural practices.

Omnia Trial:

Laboratory assay using red podzol A horizon soil (sandy loam) to study K-Humate effects on Ca penetration and retention in soils.

K-HUMATE® 26 increased the movement of calcium down the subsoil and plant root zone where it is most needed. Greater calcium concentration in the soil treated with K-HUMATE® 26 was evident down to a depth of 2.5 inches. This means quicker response from applied calcium in terms of nutrient availability and plant uptake.



FREQUENTLY ASKED QUESTIONS

Q. When is the best time to apply K-HUMATE® 26?

A. For best results apply K-HUMATE® 26 with fertilizer application, or right before fertilizer is applied.

Q. How much K-HUMATE® 26 do I need and how do I apply in the field?

A. Between 1 to 5 gallons per / acre during the growing season is effective. If possible, multiple applications of 0.5 to 1.0 gallons per / acre each spread over the growing season is more effective than a high single dose rate. Before application, dilute K-HUMATE® 26 in water.

Q. Is there a particular soil type or crop that will benefit most from applications of K-HUMATE® 26?

A. K-HUMATE® 26 is beneficial to all crops and soil types, sandy, loamy, and clayey. It improves nutrient and water retention, leading to more vigorous plant growth and, in the longer term, better soil structure.

Q. Can I reduce my fertilizer applications if I use K-HUMATE® 26?

A. In order to secure the full potential of the crop, it is better to keep the recommended fertilizer rates. Reducing fertilizers will not help sustain the increased plant growth needed to secure a higher crop potential.

Q. How quickly can I expect to see benefits from the use of K-HUMATE® 26?

A. Better nutrient uptake and plant vigor have been observed within a few weeks and will continue throughout the growing season with regular applications of K-HUMATE® 26 resulting in a higher yield and plant vitality. Effects on physical properties of soils will generally take longer with annual applications.

The Role of K-HUMATE® 26 in Saline and Sodic soils

Saline and sodic soils present challenges to agriculture that affect agriculture productivity. Saline soils have high concentrations of soluble salts such as sodium chloride, magnesium chloride, potassium chloride, calcium carbonate, magnesium sulfate etc., causing osmotic stress on plants by reducing their ability to absorb water and essential nutrients. Sodic soils have excess sodium (Na) that disperse soil particles, leading to poor soil structure, compaction, and reduced drainage in addition to nutrient imbalances affecting the uptake of essential nutrients like calcium and magnesium.

Agricultural practices such as soil amendments can help mitigate the challenging effects of these soil types.

In Hanford, CA a grower has poorly structured soils with low permeability stemming from the addition of dairy effluent for several years (Figure1). The analysis of the effluent in the digester showed an EC of 9.66 mmhos/cm (9.66 ds/m) and the one of the lagoon an EC of 8.95 mmhos/cm (8.95 ds/m). Na was 319 mg/L (319 ppm) in the digester and 302 mg/L (302 ppm) in the pond and TDS was 4300 mg/L (4300 ppm) in the digester and 3700 mg/L (3700 ppm) in the lagoon (Table 1).

As a result, the soil was treated with 1-2 gal / ac of K-HUMATE® 26 (20% humic acids based of the CDFA analysis), and the soil samples analysis showed a decrease in the EC at the top 3 inches from 6.80 ds/m at 1 gal / ac of K-HUMATE® 26 to 4.47 ds/m at 2 gal/ac of K-HUMATE® 26 (Figure 2).

***Figure 1**: poorly structured soils with low permeability in Hanford, CA.*

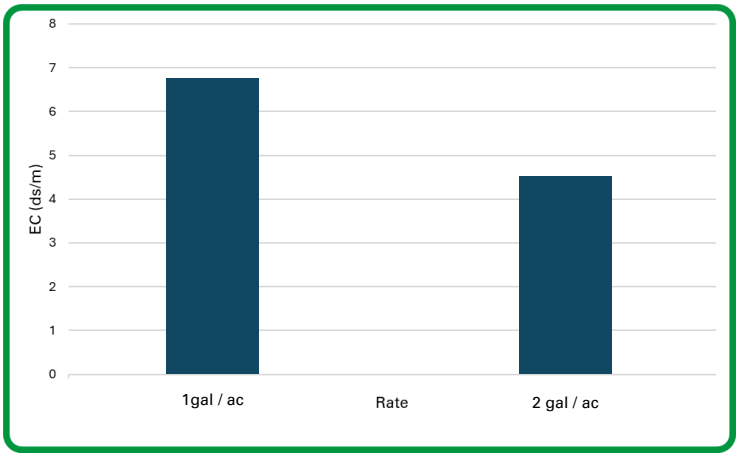


***Figure 2**: EC analysis of the K-HUMATE® 26 treated soil.*

Measurements	Digester	Lagoon
EC (ds/m)	9.86	8.95
Na (ppm)	319	302
TDS (ppm)	4300	3700

***Table 1:** Digester and Lagoon analysis.*

Humic acids play several important roles in alleviating sodic and saline soils. They can improve soil structure, nutrient availability, and water retention, thereby mitigating the effects of sodicity and salinity. Here is how humic acids contribute to soil improvement in sodic and saline soils:

Sodium displacement:

Humic acids have high CEC that can facilitate the displacement of sodium ions from the soil exchange complex. They form complexes with sodium ions, making them more soluble and mobile, which promotes their leaching from the root zone. As a result, the sodium content in the soil decreases, alleviating sodicity issues.

Improvement of soil structure:

Humic acids can act as soil conditioners, improving soil structure and aggregation. They promote the formation of stable soil aggregates, which increases soil porosity and aeration. Improved soil structure enhances water infiltration and drainage, reducing the risk of waterlogging and promoting the leaching of excess salts from saline soils.

Buffering capacity:

Humic acids possess buffering capacity, which helps to stabilize soil pH. In sodic soils, excessive sodium can lead to alkaline conditions, which are detrimental to plant growth. Humic acids can buffer pH fluctuations, maintaining a more neutral pH range conducive to plant growth and nutrient availability.

Nutrient retention and availability:

Humic acids can chelate essential nutrients such as iron (Fe), manganese (Mn), zinc (Zn), and copper (Cu), forming stable complexes that are less prone to leaching. This enhances the retention and availability of nutrients in the soil, promoting healthier plant growth and mitigating nutrient deficiencies commonly observed in sodic and saline soils.

Stress alleviation:

Humic acids can alleviate stress in plants growing in sodic and saline soils. They enhance plant root development and physiological functions, increasing tolerance to abiotic stresses such as high sodium and salt concentrations. This leads to improved plant growth and productivity in challenging soil conditions.

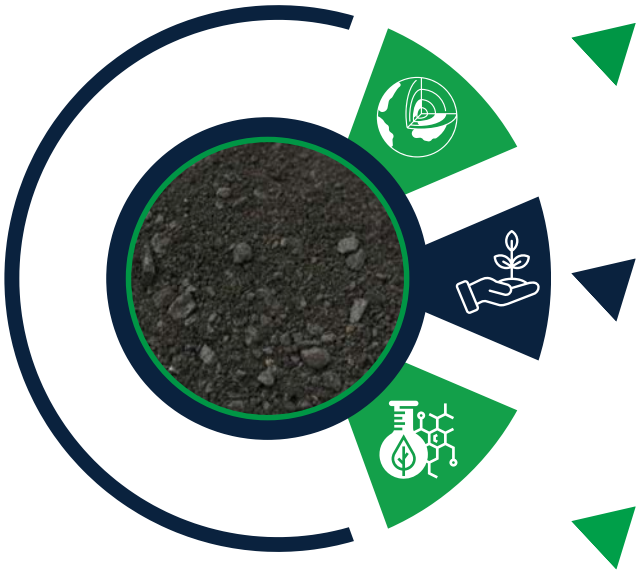
AUSTRALIAN VS AMERICAN LEONARDITE

American and Australian leonardite share common characteristics such as humic acids and their use in agriculture and horticulture as soil conditioners and fertilizer additives. However, there might be differences in terms of their specific compositions, origins, and processing methods.

The exact differences between leonardite from the USA and the one from Australia would depend on factors such as geological formations, organic matter sources, extraction processes.

The OMNIA leonardite in Australia is younger and more oxidized which means more oxygen on the functional groups (more negative sites and higher CEC).

Also, the Australian leonardite has lower minerals content such as Ca and Mg that makes it possible to produce high concentration of humic acids with no insoluble sludge.



Geological Formation

The brown coal fields of the Gippsland basin in South-eastern Victoria are the only known source of high quality humates in Australia, producing what is possibly the richest of all humates mined in the world today.

Organic Matter Sources

Within the Gippsland Basin of Victoria where these brown coals are found, there also occurs a unique geological material which has undergone natural, in situ, weathering and oxidation. This material is known as Australian Leonardite.

Extraction Process

The Gippsland humates have a high humic and fulvic acid content that was born from a fresh water site. They are extracted in a process that allows these fractions to be very soluble. Then after the extraction process, the Humic solution is then dried at lower temperatures to preserve all the valuable organics left with no ash content.

QUALITY IS CRITICAL!

Q. Why should I buy K-HUMATE® 26?

A. Omnia stands by their product in terms of quality and humic acid concentration. K-HUMATE® 26 is manufactured in Australia using local resources and raw materials.

GUARANTEED ANALYSIS % (w/w)	
Humic Acid - 20%	Potassium ($K_2$0) - 6%

It is imperative to stick with a reputable company that can provide independent lab analysis of their product

QUALITY ASSURANCE

Omnia Specialities Australia manufactures one of the highest quality and concentrated humic acids in the world. K-HUMATE® 26 is produced in the Latrobe Valley in Gippsland, Victoria, Australia, using only Australian resources and raw materials. K-HUMATE® 26 is internationally recognized for its product quality and proven performance.

AVAILABILITY

K-HUMATE® 26 liquid is available in 5 gallon and 265-gallon totes, bulk tanks and mobile tankers.

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