

# How Hydro-Bio Inputs Can Benefit Landscapers

---

## *Enhancing Lawns, Plants, and Soil Health*

Landscaping professionals are constantly seeking innovative ways to enhance the health and appearance of lawns, plants, and trees while minimizing environmental impacts. The listed inputs below offer a comprehensive approach to achieving goals such as growing robust lawns, reducing fertilizer use, increasing plant health, improving soil structure, and more.

### **1. Humic Acid**

Improves soil structure and increases nutrient availability. Supports deep root feeding, improves water retention, and reduces dependency on chemical fertilizers. Helps prevent transplant loss and supports new sod installation.

### **2. Fulvic Acid**

Chelates and transports nutrients into plant cells. Encourages deep root growth and nutrient absorption while reducing the need for synthetic fertilizers.

### **3. Kelp Extract**

Contains growth hormones and trace minerals that promote plant resilience. Helps improve soil health, combat fungal diseases, and increase transplant survival rates.

### **4. Evaporated Cane Juice**

Natural carbon source that supports beneficial soil microbes. Enhances fertility and structure, supports root growth, and reduces fertilizer dependency.

### **5. Hydroxypropyl Methylcellulose**

Improves water retention and acts as a soil stabilizer. Aids in preventing transplant shock and supports hydration for new sod.

### **6. Lactobacillus plantarum Lp-G18**

Improves decomposition, suppresses pathogens, and builds plant resilience. Enhances soil health and supports reduced chemical usage.

### **7. Bacillus Species**

Includes multiple strains with unique benefits:

- *Bacillus subtilis* BS-GA28: Protects against fungal diseases.
- *Bacillus licheniformis* BL-GA26: Enhances nutrient cycling and soil structure.
- *Bacillus pumilus* BP-GA62: Promotes strong root development.

- *Bacillus amyloliquefaciens* BA-GA77: Suppresses pathogens and aids transplanting.
- *Bacillus megaterium* BM-GA53: Increases phosphorus availability for lawn health.

### 8. *Trichoderma viride* TV-GA81

Biocontrol fungus that defends against soil-borne fungal pathogens. Improves soil structure and root development.

### 9. Bio-Synthesized Nanoparticles

Boost nutrient uptake at the cellular level. Enhances soil microbial activity, reduces chemical dependency, and supports stress resistance during transplanting.

### Scientific References Vital Humic for Landscapers

- Hoitink, H. A. J., and Boehm, M. J. (1999). Biocontrol within the context of soil microbial communities: A substrate-dependent phenomenon. *Annual Review of Phytopathology*.
- Chen, Y., and Aviad, T. (1990). Effects of humic substances on plant growth. In *Humic substances in soil and crop sciences*.

### Disclaimer

*This document is provided for informational purposes only. While the inputs described are based on known agronomic principles, their effectiveness may vary depending on local soil conditions, plant varieties, and environmental factors. This is not a substitute for certified landscape or horticultural advice. Always consult with a qualified landscape professional or agronomist before applying new products or practices to your landscape management program.*

## Vital Humic Commitment to Quality and Transparency in Ingredients and Manufacturing

---

At our company, we pride ourselves on transparency. We are not afraid to list all our ingredients, including their quantities and, more specifically, the bacterial strains and sub-strains (legacy bacteria) that we use. This openness stems from our confidence in the quality and efficacy of our products. Although the components we use are widely known and accessible, the true secret to our success lies in our unique sourcing and stringent quality control processes.

## **Vital Humic Ingredient Sourcing and Quality Control**

All our ingredients are produced to meet our specific requirements, ensuring they pass our rigorous testing and efficacy standards. These ingredients are manufactured in small batch quantities exclusively for our purchase, a practice we believe is essential for maintaining a consistent product. Our meticulous approach to sourcing guarantees that every component we use is of the highest quality, contributing to the superior performance of our products.

## **Small Batch Production**

We believe that producing ingredients in small batches is crucial for maintaining consistency and quality. Each batch is carefully monitored and tested to ensure it meets our stringent standards. This attention to detail allows us to deliver products that consistently meet our customers' expectations, providing reliable and effective solutions.

## **Vital Humic Fermentation Process**

One of the key aspects of our manufacturing process is fermentation. This method, while time-consuming, is underpinned by a robust scientific foundation. We did not select our bacterial strains solely for their field performance; their role in the fermentation process is equally critical. These bacteria are chosen for their ability to produce bio-synthesized nanoparticles, which enhance the efficacy of our products.

## **Extended Fermentation Period**

The proprietary fermentation process we employ takes a considerable amount of time, and for good reason. It is essential to allow the bacteria sufficient time to perform their metabolic functions. During this extended period, the bacteria break down molecules into progressively smaller molecules, repeatedly undergoing metabolism. This process not only creates new molecules but also enhances the bacteria's ability to thrive in various environments and conditions.

## **Bio-synthesized Nanoparticles**

Vital Humic bacterial strains play a pivotal role in the production of bio-synthesized nanoparticles. These nanoparticles are integral to the effectiveness of our products, as they enhance the delivery and performance of the active ingredients. By harnessing the natural abilities of our bacteria, we can produce products that are more effective and efficient.

## **Scientific Foundation and Innovation**

Our approach to manufacturing is deeply rooted in scientific principles. We continuously innovate and refine our processes to ensure we are producing the best possible products.

This commitment to science and innovation is reflected in every aspect of our production, from ingredient sourcing to the final product.

## Research and Development

Our extensive research and development efforts are a testament to our commitment to quality and innovation. We invest heavily in R&D to ensure we are utilizing the latest scientific advancements in our products. This focus on research allows us to develop unique and effective solutions that meet the evolving needs of our customers.

## Commitment to Customer Satisfaction

Ultimately, our goal is to provide our customers with products that are both effective and reliable. We believe that our transparency, quality control, and scientific approach set us apart from the competition. By maintaining these high standards, we aim to build long-lasting relationships with our customers based on trust and satisfaction.

## Quality Assurance

Our quality assurance processes are designed to ensure that every product we produce meets our rigorous standards. From raw material sourcing to final product testing, we leave no stone unturned in our quest for quality. This meticulous approach ensures that our customers receive products they can rely on.

## Disclaimer

*This document is intended for informational purposes only and does not constitute a warranty or guarantee of product performance. The manufacturing and quality control descriptions are based on current practices and may be refined over time in line with scientific and regulatory developments. Always consult with a qualified expert when evaluating inputs for specific agricultural, horticultural, or ecological applications.*

# Vital Humic Hydro-Bio Improves Brix Levels for Plant Health and Insect Control

---

*How Various Ingredients Enhance Brix Levels*

## **Introduction**

Brix levels refer to the sugar content in plant tissues, an important indicator of plant health and vigor. High brix levels are associated with better photosynthesis, nutrient uptake, and resistance to pests and diseases. This document explores the effectiveness of various ingredients—such as humic acid, fulvic acid, kelp extract, molasses, and more—in enhancing brix levels both in soil and as foliar sprays. We will also discuss the importance of brix levels for plant health and their role in insect control.

## **Vital Humic Hydro-Bio Key Ingredients for Enhancing Brix Levels**

### **Humic Acid**

Improves soil structure, nutrient uptake, and photosynthesis. Used in foliar applications to stimulate enzyme activity and sugar production in plants.

### **Fulvic Acid**

Chelates nutrients for better absorption, promotes root development, and enhances nutrient transport within the plant, increasing sugar content.

### **Kelp Extract**

Provides hormones and nutrients that support photosynthesis and stress tolerance, resulting in higher brix levels when applied as a foliar spray.

### **Molasses**

Supplies energy for beneficial microbes, improves nutrient cycling, and delivers sugars to boost plant energy and brix values.

### **Evaporated Cane Juice**

Provides carbohydrates that enhance soil microbiology and offers an immediate energy boost to plants when used as a foliar spray.

### **Hydroxypropyl Methylcellulose (HPMC)**

Improves foliar spray adhesion and efficacy, enhancing the uptake of nutrients and leading to increased brix levels.

### **Beneficial Microorganisms**

*Lactobacillus plantarum*, *Bacillus subtilis*, *Bacillus licheniformis*, *Bacillus pumilus*, *Bacillus amyloliquefaciens*, *Bacillus megaterium*, and *Trichoderma viride* enhance soil health, nutrient cycling, and stress resistance, improving plant vigor and brix levels.

## The Importance of Brix Levels

### Brix Levels and Plant Photosynthesis

Higher brix levels reflect efficient photosynthesis, leading to increased energy production, better growth, and enhanced resistance to stress and disease.

### Brix Levels and Plant Health

High brix is linked with stronger cell walls, better nutrient uptake, and improved crop flavor, shelf life, and nutritional value.

### Brix Levels and Insect Control

Insects are less likely to feed on high-brix plants due to difficulty in digesting sugars and penetrating stronger plant tissues.

### Chart: Brix Levels and Their Effects on Insects

| Brix Level (%) | Effect on Insects                        |
|----------------|--|
| 0-4            | Highly susceptible to insect damage      |
| 4-8            | Moderately susceptible to insect damage  |
| 8-12           | Low susceptibility to insect damage      |
| 12-20          | Very low susceptibility to insect damage |
| 20+            | Highly resistant to insect damage        |

### Molasses and Cane Sugar for Higher Brix Levels

Molasses and evaporated cane juice are carbohydrate-rich foliar sprays that increase brix levels by supplying plants with immediate energy. They support nutrient uptake, boost photosynthesis, and improve crop resilience, yield, and pest resistance.

### Scientific References Vital Humic Hydro-Bio (Brix Levels)

- Barker, A. V., and Pilbeam, D. J. (2015). Handbook of Plant Nutrition. CRC Press.
- Tucker, M. R. (1999). Essential plant nutrients: Their presence in North Carolina soils and role in plant nutrition. NC Department of Agriculture.

# How Each Ingredient in Vital Humic Hydro-Bio Functions as an Effective Fungicide

*In the Soil and as a Foliar Spray*

Each component of Vital Humic Hydro-Bio contributes uniquely to fungicidal protection through its role in strengthening plant immunity, enriching microbial diversity, and suppressing fungal pathogens. This guide outlines how these ingredients function both in soil applications and when used as foliar sprays.

### **Humic Acid**

Enhances soil structure and fertility, promotes root development and microbial activity. In foliar form, it boosts nutrient uptake and plant immune response.

### **Fulvic Acid**

Chelates nutrients and supports nutrient transport and decomposition. As a foliar spray, it boosts plant cell absorption and mineral uptake, enhancing resistance.

### **Kelp Extract**

Supplies natural growth hormones that fortify cell walls. In foliar applications, it quickly enhances stress resilience and disease resistance.

### **Molasses**

Feeds beneficial microbes in soil and on leaves. Helps suppress fungal pathogens by energizing microbial competition and activity.

### **Evaporated Cane Juice**

Supports microbial growth and soil fertility. As a foliar application, it creates a surface ecology hostile to fungal development.

### **Hydroxypropyl Methylcellulose**

Forms a protective film that blocks fungal spores. Also improves moisture retention in soil and foliar spray adhesion.

### **Lactobacillus plantarum Lp-G18**

Produces lactic acid to suppress fungal growth. Establishes beneficial colonies on foliage and enhances soil microbial diversity.

### **Bacillus subtilis BS-GA28g**

Releases antibiotics and enzymes that kill fungi. Builds protective root biofilms and inhibits surface fungal spores as a foliar spray.

### **Bacillus licheniformis BL-GA26**

Suppresses fungi by producing antimicrobial metabolites. Promotes microbial balance in soil and surfaces for fungal disease defense.

### **Bacillus pumilus BP-GA62**

Degrades fungal cell walls and secretes growth-inhibiting compounds. Effective as a foliar biocontrol agent and in root health support.

### **Bacillus amyloliquefaciens BA-GA77**

Supports plant growth and blocks fungal development. Provides protective colonization both in rhizosphere and on foliage.

### **Bacillus megaterium BM-GA53**

Improves immunity and nutrient uptake. Suppresses fungal pathogens while building plant strength and microbial shielding layers.

### **Trichoderma viride TV-GA81**

Attacks fungal pathogens directly and promotes growth. Active in organic matter breakdown and as a foliar antifungal colonizer.

## **Conclusion**

Each ingredient in Vital Humic Hydro-Bio plays a role in defending plants from fungal diseases. Through microbial competition, enhanced nutrient uptake, and physical or chemical suppression of pathogens, these components work together to strengthen plant immunity. Whether used in the soil or as foliar protection, this blend provides a natural and effective alternative to synthetic fungicides.

## **Disclaimer**

*The information presented in this document is intended for educational and reference purposes only. While supported by agricultural literature and field observations, results may vary based on crop type, climate, application method, and other environmental factors. This document does not constitute medical or pesticidal claims and should not replace certified crop protection recommendations. Always consult with a qualified agronomist or plant health specialist before implementing new inputs.*

# **Vital Humic Proprietary Fermented Bio-Synthesized Nanoparticles**

---

*Understanding the Role of Bacteria and Their Impact on Plant Health*

## **Introduction**

In recent years, the development of bio-synthesized nanoparticles has gained significant attention due to their eco-friendly nature and potential applications in various fields,

including agriculture. These nanoparticles are produced through biological processes, often involving the fermentation of specific bacteria. This document explores the production of bio-synthesized nanoparticles, the role of certain bacteria, and their efficacy as adjuvants or surfactants in agriculture. Additionally, it examines the adverse effects of traditional adjuvants and surfactants on plant health.

## **Bio-Synthesized Nanoparticles in Fermentation Processes**

Vital Humic bio-synthesized nanoparticles are tiny particles produced through biological processes, typically by microorganisms such as bacteria, fungi, and plants. These nanoparticles are synthesized through various mechanisms, including intracellular and extracellular routes, during the fermentation process. Vital Humic's proprietary fermentation process involves the cultivation of microorganisms under controlled conditions, leading to the production of nanoparticles as by-products of their metabolic activities.

## **Production Mechanism**

During Vital Humic proprietary fermentation, microorganisms secrete enzymes and other biomolecules that facilitate the reduction of metal ions to form nanoparticles. The nanoparticles are stabilized by capping agents present in microbial culture. The size, shape, and properties of these nanoparticles can be influenced by factors such as the type of microorganism, growth conditions, and the presence of specific nutrients or additives.

## **Bacteria Assisting in the Production of Vital Humic Bio-Synthesized Nanoparticles**

### **Lactobacillus plantarum Lp-G18**

Known to produce silver nanoparticles (AgNPs) with antimicrobial properties beneficial in agricultural applications.

### **Bacillus subtilis BS-GA28**

Synthesizes gold nanoparticles (AuNPs) that offer high biocompatibility and stability, ideal as agricultural adjuvants or surfactants.

### **Bacillus amyloliquefaciens BA-GA77**

Produces zinc oxide nanoparticles (ZnO-NPs), known to support plant growth and resistance against pathogens.

## Efficacy of Bio-Synthesized Nanoparticles as Adjuvants or Surfactants

- **Enhanced Efficacy:** Improves the delivery and absorption of active ingredients, reducing required application rates.
- **Biocompatibility:** Naturally produced and biodegradable, minimizing environmental and ecological risks.
- **Controlled Release:** Enables sustained release of actives for long-lasting effects.

## Adverse Effects of Traditional Adjuvants and Surfactants on Plant Health

While synthetic surfactants and adjuvants may improve application efficiency, they can negatively impact plant and environmental health.

### Phytotoxicity

Synthetic surfactants may cause leaf burn, chlorosis, and stunted growth, reducing photosynthetic activity and crop yield.

### Soil and Water Contamination

Persistent compounds may accumulate, harming soil microbiota and contaminating aquatic systems.

### Non-Target Effects

Synthetic compounds may affect beneficial insects, soil organisms, and overall biodiversity.

## Conclusion

Vital Humic bio-synthesized nanoparticles, derived from proprietary fermentation processes, offer a sustainable and effective alternative to traditional adjuvants and surfactants in agriculture. With support from microbial agents like *Lactobacillus plantarum*, *Bacillus subtilis*, and *Bacillus amyloliquefaciens*, these nanoparticles enhance agricultural spray efficacy while protecting plant and environmental health. Ongoing research continues to reveal their potential in sustainable agricultural solutions.

### Disclaimer:

*The information presented in this document is intended for educational and informational purposes only. It does not constitute a guarantee of performance or regulatory approval. Statements regarding the role of microorganisms and bio-synthesized nanoparticles are based on current scientific understanding and in-house research. As agricultural outcomes may vary based on environmental conditions, crop type, and application methods, users are advised to perform their own trials and consult with agricultural specialists before use. Vital Humic makes no claims of curing or preventing plant diseases or replacing regulated agricultural products.*

