IONIC & NANO Explanation in Fertilizers – Soil & Foliar Uptake

NANO TECHNOLOGY

Principle

NANO technology uses **ultra-fine particles in the nanometer range** to act as carriers and penetration enhancers for nutrients.

Due to their extremely small size and high surface area, NANO particles exhibit:

- High reactivity (speed up the photosynthesis)
- Strong adhesion to leaf surfaces
- Enhanced mobility within plant tissues

Leaf Penetration & Stomatal Interaction

NANO particles are small enough to:
Penetrate the waxy cuticle of leaves • Interact directly with **stomata**

Once applied, they help **open and optimize stomatal function**, enabling:
Faster nutrient entry
Improved gas exchange
More efficient water regulation

This significantly enhances the transport of minerals from the leaf surface into internal plant tissues and down to the root system via the vascular network.

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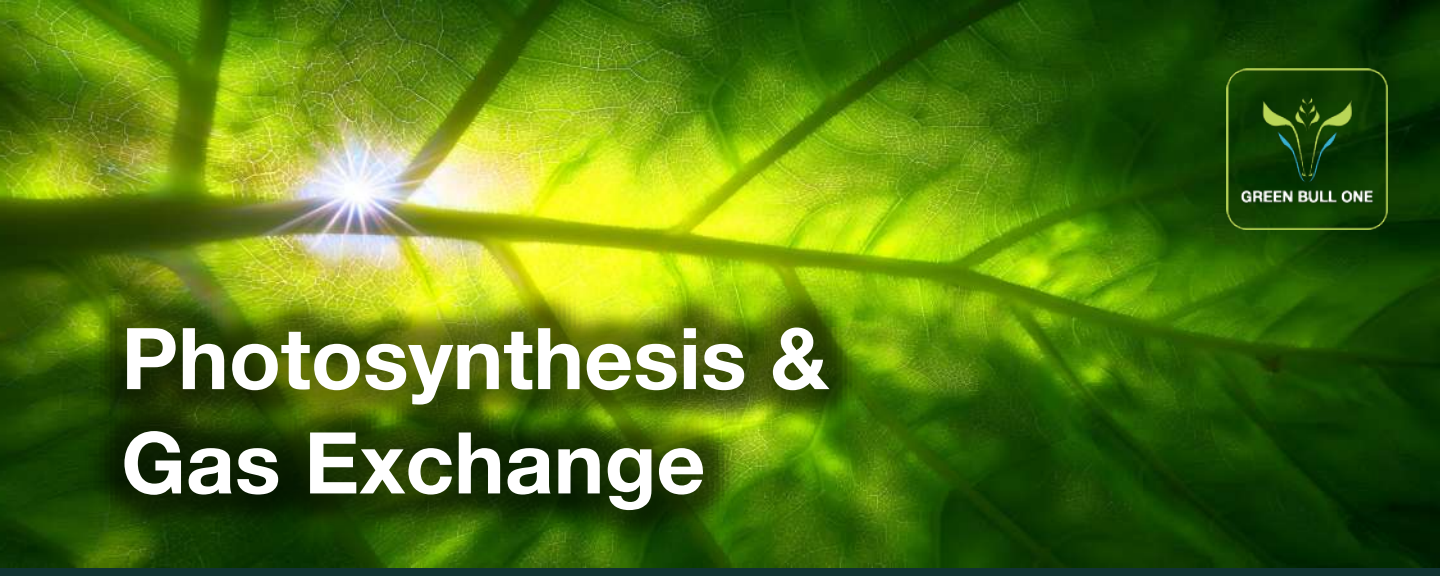

Photosynthesis & Gas Exchange

A. Nanotechnology = Immediate Bioavailability

Our nanoparticles are extremely small, stable, and homogeneously distributed. This allows them to reach the root cells within minutes—not after days like conventional fertilizers. The effect: Photosynthetic enzymes are activated immediately, chlorophyll levels increase, and light energy is used more efficiently.

B. Optimized Stomatal Function = Increased CO_2 Uptake

The fertilizer improves water balance, ion balance, and osmotic stability. This keeps the stomata open longer—even in hot weather or under salt stress. The result: Higher CO_2 uptake and more stable, efficient photosynthesis.

C. Increased Transpiration = Faster Nutrient Flow

Improved root development and higher xylem conductivity increase transpiration. This accelerates:
CO_2 transport to the leaves
Nutrient flow
Cooling of the plant
A self-reinforcing cycle for growth and stress resistance.

D. Accelerated Energy Conversion in Chloroplasts

Our micronutrients (Fe, Mg, Mn, Zn) drive the photosynthesis reaction chain. Thanks to nanotechnology, they are immediately available – thereby increasing ATP production, sugar synthesis, growth, and biomass.

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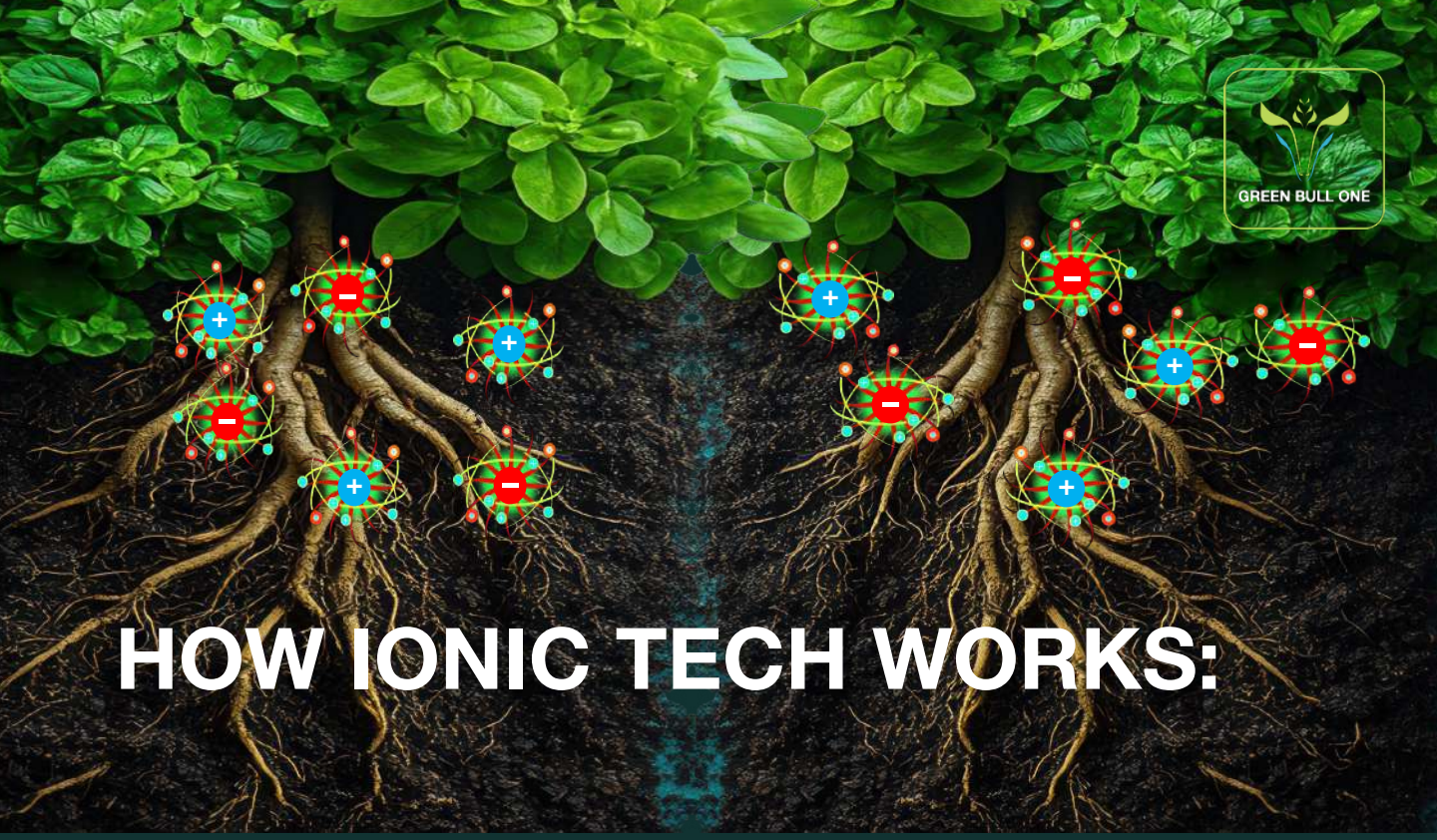

HOW IONIC TECH WORKS:

- **Stimulates Ion Channels:** The unique formula enhances the movement
of ions across cell membranes, optimizing nutrient absorption.
- **Activates Enzymes & Hormones:** The ionic stimulation triggers vitalenzymes and natural growth hormones (auxins, cytokinins), improving growth speed and resilience.
- **Boosts Stress Resistance:** Plants treated with Ikue fertilizer show higher tolerance to drought, salinity, and disease due to ionic balance and cell wall strength.
- **Enhances Photosynthesis & Rooting:** By activating Mg^{2+} and PO_4^{3-}, the fertilizer increases energy production and deeper, healthier roots.

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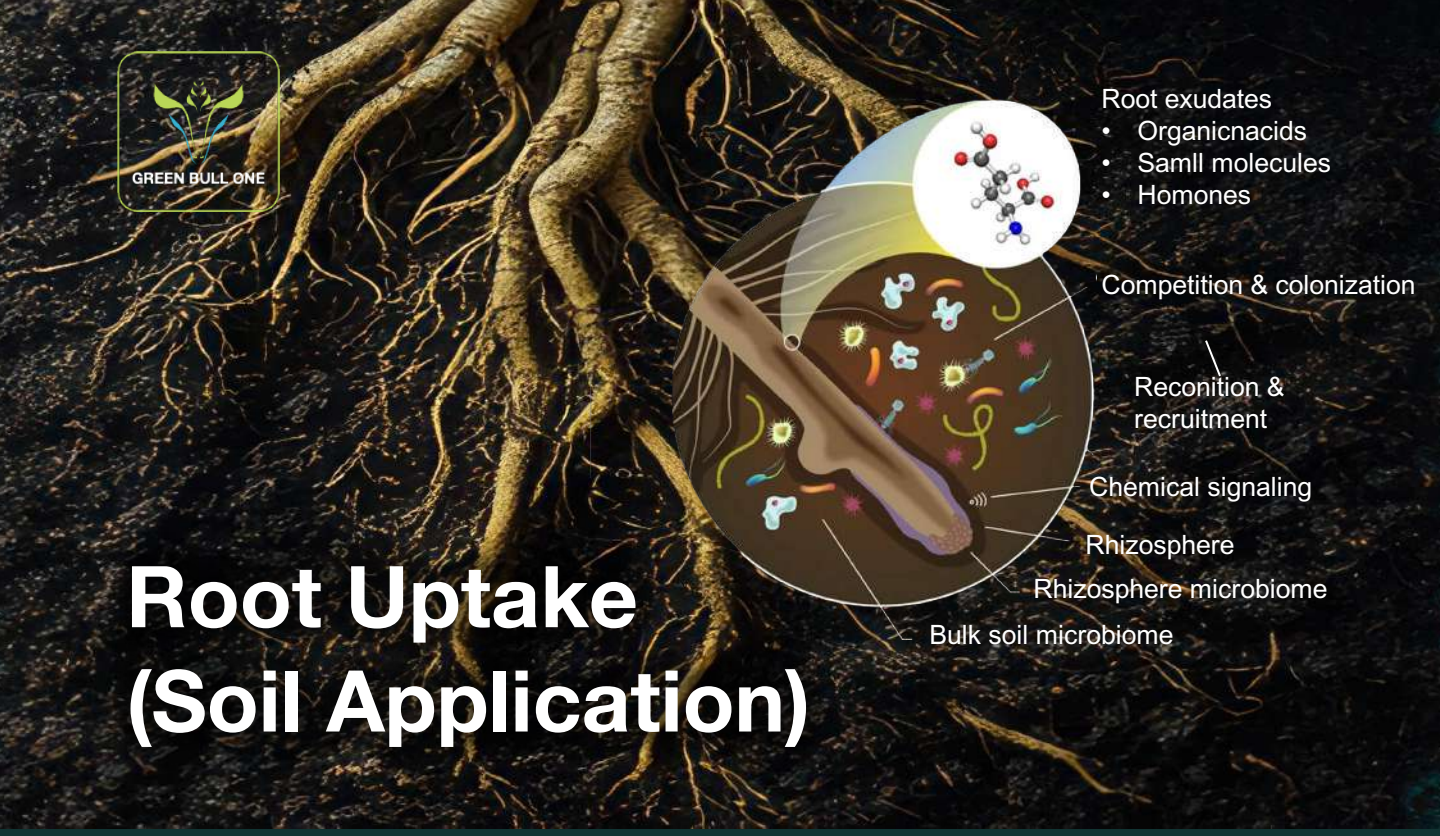

Root Uptake (Soil Application)

Uptake

In the soil, plant roots are surrounded by a charged environment known as the **rhizosphere**. Root membranes contain ion channels and transport proteins that selectively absorb nutrients based on their electrical charge.

IONIC technology ensures that nutrients are:

- **Fully soluble**
- **Electrically stable**
- **Immediately available for uptake**

This allows roots to absorb nutrients efficiently without requiring microbial conversion or chemical transformation in the soil.

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Combined Effect: IONIC + NANO

Effect

By combining **IONIC nutrient availability** with **NANO-scale delivery**, the fertilizer system achieves:

- Faster nutrient absorption
- Reduced nutrient loss (leaching, volatilization)
- Lower application rates
- Improved stress resistance
- Stronger root and shoot development
- Higher and more consistent yields

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Foliar Uptake (Leaf Application)

Uptake

Leaves are capable of absorbing minerals and ions through:

- The **cuticle**
- The **stomata (leaf pores)**

When nutrients are present in ionic form, they can pass through these pathways and enter the plant's vascular system, where they are distributed to growth zones, flowers, fruits, and roots.

Enhanced Transport Inside the Plant

After penetration, NANO particles facilitate:

- Rapid movement of nutrients through xylem and phloem
- Uniform distribution of minerals throughout the plant
- Reduced nutrient fixation or immobilization

This results in higher nutrient-use efficiency compared to conventional fertilizers.

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Human Analogy

Just as nano-sized molecules or drug carriers in the bloodstream can cross cell membranes and deliver active substances directly into human cells, NANO particles provide plants with:

- Direct nutrient access
- Faster internal transport
- Higher biological efficiency

This works both **through the leaves and through the roots**.

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