

Why Growers Are Embracing Micronutrient Fertilizers

It's a well-established fact in agriculture: while crops require less **NPK liquid foliar fertilizer** and **NPK gel suspension foliar fertilizer** compared to macronutrients like nitrogen, phosphorus, and potassium, their physiological functions are irreplaceable. A deficiency in even a single micronutrient can lead to distinct physiological defects, ultimately impacting plant growth and yield. This is why an increasing number of growers are recognizing the importance of applying **calcium magnesium boron zinc iron fertilizer** and other micronutrient fertilizers.

The Multifaceted Benefits of Micronutrients

- 1. Boosting Crop Yield:** In many fields and greenhouses, prolonged overuse of macronutrient fertilizers can degrade soil quality, leading to diminishing returns in crop yield. The targeted application of micronutrient fertilizers, such as **EDDHA-Fe**, helps to balance nutrient levels within the plant, ensuring it receives the full spectrum of essential elements. This is particularly effective in increasing yields in medium to low-production fields and is a crucial strategy for maintaining continuous high yields in already productive land.
- 2. Enhancing Crop Quality:** Beyond improving inorganic nutrient balance and increasing yield, micronutrient fertilizers significantly enhance the quality of agricultural produce. For instance:
 - **Boron** promotes pollen tube elongation, thereby improving fruit set.
 - **Sulfur** is a component of sulfur-containing amino acids (cysteine and methionine), influencing protein and oil content.
 - **Magnesium** is vital for chlorophyll synthesis and photosynthesis, acting as an activator for various enzymes that promote fat and nitrogen metabolism, as well as vitamin synthesis, all contributing to superior crop quality.
- 3. Improving Fertilizer Utilization Efficiency:** Supplementing with micronutrients helps to balance the ratios between macro-, meso-, and micronutrients. This promotes better nutrient absorption by crops, reduces waste from the unbalanced application of single-element fertilizers, and minimizes environmental pollution caused by fertilizer runoff.
- 4. Strengthening Crop Resistance:** The consistent supply of all necessary elements through the application of micronutrient fertilizers ensures healthy crop growth. This significantly enhances the plant's resistance to diseases, cold, heat, and drought. By preventing deficiency-induced weakness, crops are less susceptible to pest and disease.

infestations. For example, **calcium** binds with pectin to strengthen cell wall stability, reducing stress damage. **Silicon** (though not essential, it is beneficial) thickens cell walls, reducing pathogen invasion. **Boron** aids in the proper transport of sugars, enhancing resistance, as boron-sugar complexes create a more acidic cell sap, which is unfavorable for pathogen growth.

5. **Maximizing Economic Returns:** Although micronutrient fertilizers are used in smaller quantities than macronutrient fertilizers, they offer a significant return on investment. A smaller input can lead to substantially greater economic benefits.

Reasons for Micronutrient Deficiencies

Several factors contribute to micronutrient deficiencies in crops, often stemming from soil conditions and fertilization practices. For example, in alkaline soils, iron and zinc are prone to fixation, while in acidic soils, molybdenum's availability is low. Excessive phosphorus application can bind with zinc and iron, forming insoluble compounds and inducing antagonistic effects. Long-term or heavy application of inorganic fertilizers can lead to soil acidification, salinization, and compaction, disrupting the balance of micronutrients and consequently hindering crop absorption.

Typical symptoms of micronutrient deficiencies observed in practical production include blossom-end rot in tomatoes, head rot in cucumbers, white seedlings in corn, and empty shells in peanuts.

Application Methods for Micronutrient Fertilizers

- **Soil Application:** Micronutrient fertilizers can be applied as base or seed fertilizers, typically mixed uniformly with macronutrient fertilizers (NPK) and **organic fertilizer granules** or **humic acid potassium**. The application rate should be adjusted based on the crop and the specific micronutrient fertilizer, avoiding excessive amounts. For instance, when preparing soil for vegetable transplanting, fertilizers like calcium hydroxide, calcium magnesium phosphate, magnesium sulfate, magnesium oxide, ferrous sulfate, zinc sulfate, and borax can be applied alongside **NPK** compound fertilizers to replenish deficient micronutrients in the soil.
- **Foliar Application:** Foliar application involves spraying soluble micronutrient fertilizers, mixed to a specific concentration, onto the crop's foliage. This can also be done through drip irrigation or flushing with water. For example, during the growing season, calcium can be applied via flushing during the seedling stage. Before and after flowering, foliar sprays rich in **boron**, **calcium**, and **zinc** are recommended, with a focus on the plant's

young leaves or growing points. In the later stages of growth, spraying or flushing with single-element water-soluble fertilizers or compound micronutrient water-soluble fertilizers containing calcium, magnesium, and iron can prevent deficiency symptoms. It is advisable to choose products that are easily absorbed and mobile, such as chelated micronutrient fertilizers.

Important Considerations for Micronutrient Fertilizer Application

1. **Prevent Over-application:** Micronutrient fertilizers should be applied uniformly based on soil test results. Blind application can lead to crop toxicity and environmental pollution.
2. **Optimize Soil Environment:** Micronutrient deficiencies often arise not from low soil content but from poor availability, making them difficult for crops to absorb. Pre-application soil conditioning with **organic fertilizer granules, seaweed extract, humic acid potassium, fulvic acid potassium**, or microbial fertilizers can improve soil physical and chemical properties, thereby enhancing the availability of micronutrients and facilitating root absorption.
3. **Irreplaceable Role:** Micronutrients are as vital as macronutrients like nitrogen, phosphorus, and potassium. The full efficacy of micronutrient fertilizers can only be realized when the crop's demand for macronutrients is adequately met.