Borregård LignoTech

Borrechel Micronutrients
Micronutrients Complexed by Soluble Lignin

PLANT NUTRITION
The Natural Choice for Complexed Micronutrients

The trace elements in Borrechel micronutrients are fully complexed with soluble lignin derived from one of nature’s most abundant resources, trees. As such, Borrechel micronutrients meet all the requirements of sustainable agriculture and offer growers an efficient source of “naturally” complexed micronutrients for foliar and soil applications.

**MICRONUTRIENTS COMPLEXED BY SOLUBLE LIGNIN**

The ratio of soluble lignin to micronutrient in Borrechel micronutrients has been optimized to ensure proper stability of the complex over a pH range of 2-9. Borrechel is easy to use, non-phytotoxic and provide high levels of soluble & complexed micronutrients when used in foliar and/or fertigation solutions.

Borrechel micronutrients are an excellent choice for dry mixing with fertilizers. In addition, the soluble lignin present in Borrechel micronutrients is a source of added organic carbon and soluble sulfur, which are necessary nutrients for good soil microbiology and healthy plant growth. Borrechel micronutrients are safe to use and, when used properly, do not cause leaf burn.
A Proven Efficiency and Complete Action Product...

Borrechel Micronutrients
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PLANT DERIVED
Borrechel micronutrients are derived from one of nature’s most renewable resources – trees. They are an excellent source of micronutrients, organic carbon and sulphur all in a soluble form.

HIGH QUALITY COMPLEXED MICRONUTRIENTS
Borrechel micronutrients:
• Provide higher levels of water soluble and complexed micronutrients than micronutrients prepared from other complexing agents.
• Contain > 90% complexed micronutrients.
• Will not cause leaf burn.

Comparative Data vs. Other Complexing Agents

Water Soluble Iron
Complexed Iron

Water Soluble Zinc
Complexed Zinc

AA: Amino Acid; HGA: Heptagluconate; H: Humate
Soluble & complexed element determined according to European Fertilizer Regulation EC 2003/2003
SURFACE ACTIVE

Borrechel micronutrients contain surface active polymers. Borrechel micronutrients give a good distribution of the trace elements over the leaf surface without the need for additional adjuvants.

Leaf Transversal Section

WETTABILTY

Another advantage to using Borrechel micronutrients is that the soluble component is hygroscopic. This helps keep micronutrients in a water soluble form so that they can diffuse and penetrate into the leaves. Zinc sulfate spray solution dries out in a low humidity environment while Borrechel Zn remains moist & active.

33% Relative Humidity

A UNIQUE LONG-LASTING NUTRITIONAL EFFECT

PROPER FOLIAR LEVELS ALL SEASON LONG

Borrechel micronutrients ensure proper foliar levels all season long, with a stable and constant release of complexed micronutrients into the leaves. Other micronutrients only provide suitable foliar levels for a few days after spray application. For example, the figure below shows how Borrechel Fe provided higher levels of iron than did EDTA 69 days after spray application.

Fe Foliar Levels (ppm)

Trials conducted at IRTA-Estació Experimental de Lleida field station
FOLIAR UPTAKE WITH BORRECHEL

In trials conducted over a two year period in Spain and the U.S., foliar uptake of Borrechel complexed micronutrients equaled or exceeded that of micronutrients formulated with EDTA or amino acids.

TANGERINE

De Nules Clementine is a variety of tangerines that is especially sensitive to zinc and manganese deficiencies. Trials conducted in Spain with this variety showed that the uptake of zinc and manganese with Borrechel Zn or Mn equaled or exceeded that of zinc and manganese chelated with EDTA.

PEACH

Peach trees grown in alkaline soils are extremely sensitive to iron chlorosis (i.e. iron deficiency). Trials conducted in Spain with the variety, Merryl O’Henry, showed that the uptake of iron and manganese provided by Borrechel Fe or Mn equaled or exceeded that of iron and manganese chelated with EDTA.
LEMON

Lemon trees grown in alkaline soils are also extremely sensitive to iron chlorosis (i.e. iron deficiency). A trial conducted in California showed that the uptake of iron provided by Borrechel Fe equaled or exceeded that of iron complexed with more costly amino acids.

![Graph showing Fe foliar levels over time](image)

Trials conducted by Holden Research in Ventura County, CA

TOMATO

Manganese deficiency is widespread in calcareous and alkaline soils, soils with a high level of organic matter, compacted soils and acidic sandy soils. Foliar application of manganese is often recommended as the best fertilizer strategy for correcting such deficiency. A greenhouse trial conducted in Spain showed that the uptake of manganese provided by Borrechel Mn equaled or exceeded that of manganese chelated with EDTA.

![Graph showing Mn foliar levels over time](image)

Trials conducted at IRTA-Estació Experimental de Lleida field station
BORRECHEL MICRONUTRIENTS RANGE AND USE GUIDELINES

PACKAGING
Borrechel micronutrients are available in 20 kg bags arranged in 1000 kg pallet. Borrechel micronutrients can also be supplied in 1000 kg big-bags. Please contact your local sales representative to check availability of Borrechel granulated grades. They can be produced upon request and delivered in 800 kg big-bags.

USE GUIDELINES
Borrechel micronutrients are soluble in water up to 300 g/L. Add the recommended powder dose to the amount of water indicated below (never vice versa!) and mix thoroughly. Always read and follow label and safety data sheet instructions when using Borrechel micronutrients.

Foliar Application
Dissolve recommended doses per hectare into 1000 L of water. Two applications per season are recommended to prevent micronutrient deficiency. Treatments should be applied at periods of intense vegetative growth (i.e. flowering, fruit development). In post-emergence treatments, apply one treatment every 10-20 days until deficiency symptoms disappear.

Fertigation
Split recommended dosages per hectare & season into several treatments over the growing season, starting early spring. Do not exceed the concentration of 1.0-1.5 g/L in the nutrient solution.

Compatibility
Borrechel micronutrients are compatible with most of the common pesticides and fertilizers. Application together with P-fertilizers and/or calcium nitrate should be avoided if possible as it may decrease the efficiency of the treatment. A simple jar test is recommended to confirm compatibility, do not proceed further if precipitation occurs.
BORREGAARD LIGNOTECH

Borregaard LignoTech is the world’s leading manufacturer and supplier of lignin-based products. Our products are environmentally friendly and utilize a natural and renewable source of raw material.

We offer a specialty line of products to the Plant Nutrition Market, including irrigation line additives, soil conditioners, micronutrients and chelating agents. Our extensive network of production plants and sales offices will ensure optimal service and product availability to our customers worldwide.

TO LEARN MORE:

For more information about Borrechel micronutrients, please contact your local sales office at the numbers below or visit us on the web www.borregaard.com.