



 Borregaard  
LignoTech

• PLANT NUTRITION



# Marasperse® AG

The Lignosulfonate-Based Complexing Agent for Foliar Micronutrients



# The Natural Choice for Complexing Micronutrients

Marasperse® AG originates from trees, a natural and renewable resource. It is a modified sodium lignosulphonate. As such, it meets all the requirements of sustainable agriculture and offers growers a “natural” complexing agent for foliar and soil applied micronutrients.

## A LIGNOSULFONATE-BASED COMPLEXING AGENT FOR MICRONUTRIENTS

Marasperse® AG is a specialty sodium lignosulfonate designed to give superior performance when used as a complexing agent for foliar micronutrients. It is easy to use, nonphytotoxic, and produces stable complexes over a wider pH range with better tolerance to high metal concentrations than other lignosulfonate-based products.

Foliar micronutrients formulated with Marasperse® AG are clean in appearance. They have excellent storage stability, good freeze-thaw properties and low solution viscosities. In addition, Marasperse® AG provides a source of added organic carbon and soluble sulfur, which are necessary requirements for healthy crops, turf, and ornamentals. Micronutrients formulated with Marasperse® AG are safe to use and when used properly, do not cause leaf burn.

**GOOD FOR THE ENVIRONMENT.**



• PLANT NUTRITION



# Introducing a Better Way to Formulate Complexed Foliar Micronutrients...



## Marasperse® AG

The Lignosulfonate-Based Complexing Agent for Foliar Micronutrients

### PLANT DERIVED

Marasperse® AG is derived from one of nature's most renewable resources – trees. It is an excellent source of organic carbon and sulfur all in a soluble form.

### EASY TO USE

The unique properties of Marasperse® AG benefit the micronutrient formulator at many stages of his operation. In liquid form, it has low solution viscosity and is easy to transport and mix. It can be used to make metal complexes that are stable over a wider pH range and is more compatible with commonly used metal salts than conventional lignosulfonate-based complexing agents.

### PRODUCES HIGH QUALITY FOLIAR MICRONUTRIENTS

Micronutrients formulated with Marasperse® AG:

- Have low solution viscosities; this enables the formulator to produce formulations with high solids content without reducing the level of complexing agent.
- Have low insolubles; for example, the table below shows the typical insolubles in common micronutrient formulation made with Marasperse® AG.
- Have excellent storage and freeze-thaw stability.
- Will not cause leaf burn.

#### Insolubles in Common Micronutrient Formulations Made with Marasperse® AG

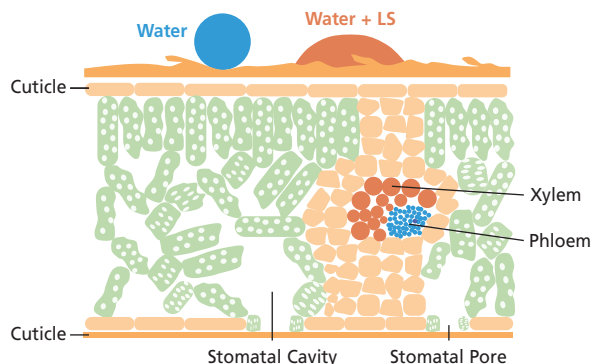
Formulation	% Insolubles (v:v)
10% Zinc	0.6
7% Manganese	0.2
5% Copper	0.2
5% Iron	0.2
5% Calcium	0.4
4% Magnesium	0.9

# GOOD FOR YOU.

## SURFACE ACTIVE

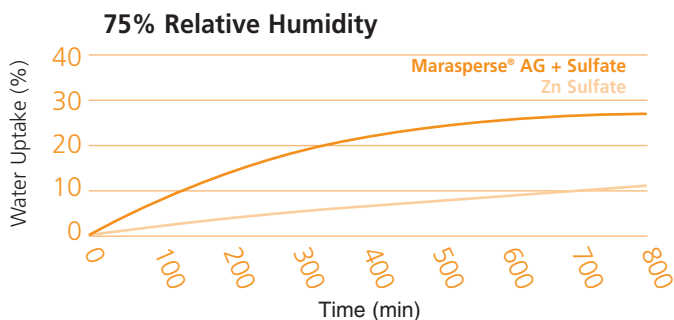
Marasperse® AG is a surface active polymer. So formulations using Marasperse® AG give good distribution of the micronutrient over the leaf surface without the need for additional adjuvants.

### Leaf Transversal Section



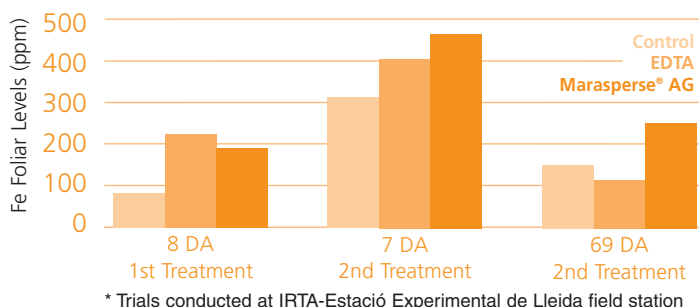
## LOW POD

Keeping nutrients in water soluble forms that can diffuse and penetrate leaves is the key to good foliar feeding. Because the polymers in Marasperse® AG are hydroscopic, micronutrients formulated with Marasperse® AG have lower points of deliquescence than those of sulfate salts and other micronutrients made from nonhydroscopic complexing agents.



## PROPER FOLIAR LEVELS ALL SEASON LONG

Other micronutrient treatments provide suitable foliar levels just a few days after spray application. Marasperse® AG ensures proper foliar levels all season long, providing a stable and constant release of complexed micronutrients into the leaves. For example, the graph below shows how Marasperse® AG provided higher levels of iron than did EDTA 69 days after spray application.



## FOLIAR UPTAKE WITH MARASPERSE® AG

In trials conducted over a two year period in Spain and the U.S., foliar uptake of micronutrients formulated with Marasperse® AG 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 in 2005 and 2006 showed that the uptake of zinc and manganese complexed with Marasperse® AG equaled or exceeded that of zinc and manganese chelated with EDTA.

**Foliar Levels of Zinc and Manganese in Treated Tangerine Trees 2005 and 2006**

Treatment	Foliar Levels of Zinc and Manganese (ppm)					
	July		September		December	
	Zinc	Manganese	Zinc	Manganese	Zinc	Manganese
<b>2005</b>						
Control (No Treatment)	32.00	14.00	17.50	16.00	14.00	16.25
Complexed with Marasperse® AG	96.75	112.25	68.25	90.25	80.00	116.50
Chelated with EDTA	45.25	41.00	23.75	24.25	19.50	28.50
<b>2006</b>						
Control (No Treatment)	54.33	43.33	15.33	14.66	15.33	13.00
Complexed with Marasperse® AG	37.66	31.33	37.00	28.66	42.66	45.00
Chelated with EDTA	59.33	49.33	25.00	25.66	20.00	22.66

\* Trials conducted at IRTA-Estació Experimental de Lleida field station

## PEACH

Peach trees grown in alkaline soils are extremely sensitive to iron chlorosis (i.e. iron deficiency). Trials conducted in Spain in 2005 and 2006 with the variety, Merryll O'Henry, showed that the uptake of iron and manganese complexed with Marasperse® AG equaled or exceeded that of iron and manganese chelated with EDTA.

### Foliar Levels of Iron and Manganese in Treated Peach Trees 2005 and 2006

Treatment	Foliar Levels of Iron and Manganese (ppm)					
	May		June		August	
	Iron	Manganese	Iron	Manganese	Iron	Manganese
<b>2005</b>						
Control (No Treatment)	81	39	75	42	196	75
Complexed with Marasperse® AG	161	95	220	107	274	118
Chelated with EDTA	78	49	75	54	188	88
<b>2006</b>						
Control (No Treatment)	86.2	13.8	316.4	35.6	154.8	39.8
Complexed with Marasperse® AG	191.0	94.6	472.8	112.2	254.0	56.2
Chelated with EDTA	225.8	108.8	411.6	95.8	116.4	46.0

\* Trials conducted at IRTA-Estació Experimental de Lleida field station

## LEMON

Lemon trees grown in alkaline soils are also extremely sensitive to iron chlorosis (i.e. iron deficiency). A trial conducted in California in 2005 showed that the uptake of iron complexed with Marasperse® AG equaled or exceeded that of iron complexed with more costly amino acids.

### Foliar Levels of Iron in Treated Lemon Trees 2005

Treatment	Foliar Levels of Iron (ppm)		
	7 June 2005	11 July 2005	27 July 2005
Control (No Treatment)	42	23	23
Complexed with Marasperse® AG	45	25	94
Complexed with Amino Acids	32	28	93

\* 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 in 2006 showed that the uptake of manganese complexed with Marasperse® AG equaled or exceeded that of manganese chelated with EDTA.

### Foliar Levels of Manganese in Treated Tomato Plants 2006

Treatment	Foliar Levels of Manganese (ppm)		
	August 2006	September 2006	November 2006
Control (No Treatment)	14	20	16
Complexed with Marasperse® AG	19	68	99
Chelated with EDTA	18	32	43

\* Trials conducted at IRTA-Cabrils field station



Marasperse® AG

## 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 cleaners, humic acids, micronutrients and complexing 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 Marasperse® AG, please contact your local sales office at the numbers below or visit us on the web [www.borregaard.com](http://www.borregaard.com).



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