# THE ALTERNATIVE **SOLUTION**

LSA used in BREXIL®, to complex micronutrients, enables better agronomic efficacy, comparable with synthetic chelating agents. LSA has a natural origin which prevents accumulation in the soil because it is recognized and used by the plant to enhance physiological processes linked to photosynthetic activity [Ertani et al., 2019].

**Guaranteed supplies of LSA for Valagro assure a constant availability of BREXIL® products to the growers**, avoiding market fluctuations that characterize synthetic chelating agents. BREXIL® line represents an alternative, effective, sustainable, and safe solution.

Microgranular technology enables a high ratio of weight/weight LSA:micronutrient in BREXIL® of approximately 8:1, to ensure a stable complex and provide a significant source of LSA to the plant.

LSA [Lignin-sulphonic acid] derives from lignin (one of the natural polymers found in wood and accounts for about 33% of the weight].

The LSA used to produce BREXIL<sup>®</sup> is derived from a single source of softwood to assure:



Consistent quality

Specific ratio of monomers with high binding properties



Leaf penetration

Phytotoxicity

### **Comparison between BREXIL®** and **EDTA**

Miz	king proprieties	•••	•••
Physiol	ogical effect on leaf	•••	NO

•••

NO

\*minimum deviation between optimal and phytotoxic dose.

•••

Potential\*

Where science serves nature

# FOCUS ON **LSA**

## **Excellent** penetration

The solution is rapidly absorbed by the leaf and arrives quickly in the innermost, physiologically active tissue layers<sup>[1]</sup>.

#### Leaf tissue anatomical changes related the location of Zn:



After 30 minutes, already approximately 20% of the micronutrient is available inside the leaf, going up to 60% within 6 hours<sup>[2]</sup>.



LAYER THICKNESS (µm)

SPONGY MESOPHYLL LAYER THICKNESS (µm) **Zn-LS COMPLEX** 

SPONGY MESOPHYLL

ZnEDTA

79.9 ± 14.74

103.8 ± 6.32

### **Physiological** processes

Scientific research confirms that LSA acts on key physiological processes of the plant [e.g. photosynthetic activity]<sup>[3]</sup>.

[1] Minnocci, A., Francini, A., Romeo, S., Sgrignuoli, A. D., Povero, G., & Sebastiani, L. (2018). Zn-localization and anatomical changes in leaf tissues of green beans (Phaseolus vulgaris L.) following foliar application of Zn-lignosulfonate and ZnEDTA, Scientia Horticulturae, 231, 15-21.

Cuticle

[2] Internal comparative evaluation of different Zn-radiolabelled formulations for foliar nutrition in bean (P. vulgaris). [3] Ertani, A., Nardi, S., Francioso, O., Pizzeghello, D., Tinti, A., & Schiavon, M. (2019). Metabolite-targeted analysis and physiological traits of Zea mays L. in response to application of a leonardite-humate and lignosulfonate-based products for their evaluation as potential biostimulants. Agronomy, 9(8), 445.

Cuticle

Palisade parenchyma

