

## THE IMPORTANCE OF FREE L-AMINO ACIDS FOR THE PLANT:

There are many biostimulant products in the current market, but the question is what concentration of the total Amino Acids are free L-amino acids and available to the plant ?

### WHAT ARE AMINO ACIDS:

Amino acids can exist with two molecular configurations :  
 / Dexter (D-amino acid)  
 / Laevus (L-amino acid)

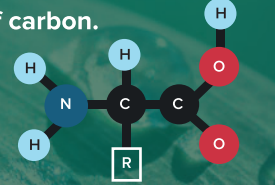
D and L are symmetric.

### ALL NATURAL AMINO ACIDS IN PLANTS ARE LAEVUS.

Dexter amino acids are originally from animal or from synthesis.

Amino acids are organic substances with an asymmetric atom of carbon.

This carbon bonds an amine group  $NH_2$  and a carboxylic group  $COOH$  and a radical R.



### WHAT ARE FREE AMINO-ACIDS ?

When amino acids are not bonded in order to form peptides or proteins, they are « free amino acids ». Free amino acids are directly and totally usable by the plant.

### FREE AMINO ACIDS ARE NATURAL, STABLE, AND NEUTRAL SUBSTANCES FOR FOLIAR SPRAYS.

They are easily absorbed by the leaves of the plant.



### L-AMINO ACIDS:

- / Free L-amino acids are directly and totally usable by the plant.
- / They are natural stable and neutral substances for foliar sprays.
- / L-amino acids play a part in many physiological processes in plants. They are important in a nutritional role during germination, synthesis of proteins, or in the formation of phytohormones.

The intake of these free amino acids, either through roots or foliar. Provides improvements of the photosynthetic process and helps to withstand stress conditions, such as water stress or salinity.

### Free AMINO ACID

Direct source of energy, readily available to the plant

### D-AMINO ACIDS:

- / The metabolism role of D-amino acids in the plant is still doubtful.
- / Studies on this topic indicate undesired agronomic effects such as growth inhibition or apparent toxicity.
- / The presence of D-amino acids may be considered as a negative indicator for biostimulant activity.



## EXPERT FORMULATION

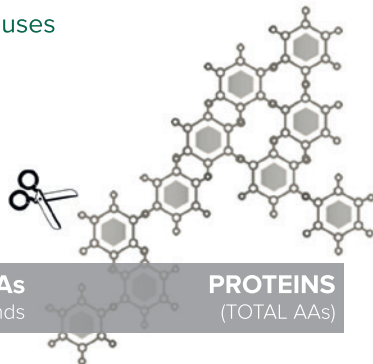
SELECTIVE NUTRITION TECHNOLOGY & BIOSTIMULANT

### L-AMINO ACID & FREE AMINO ACIDS

In stress situations, the plant uses a large amount of energy to obtain AAs and use them for its metabolism.

#### Synthesis of AAs

ATP



#### RELEASE of AAs

Energy expended to break the bonds

#### PROTEINS

(TOTAL AAs)

Directly usable by the crop  
**Energy savings**

#### FREE ENERGY

- / Helps to guide plant metabolism based on the stage of application
- / Enhances vegetative growth at the beginning of the cycle and the quality of harvest at the yield
- / Allows for enhanced support even in periods of stress

For more information on this topic, contact your local De Sangosse Territory Manager.

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Reference: Sanchez-Hernandez, L., Luisa Marina, M., & L. Crego, A. (2013). Introduction [Introduction]. In 914235254 718968546 N. Sierras Serra (Author), Enantiomeric Separation of Free L- and D- Amino Acids in Hydrolyzed Protein Fertilizers by Capillary Electrophoresis Tandem Mass Spectrometry (pp. 5022-5030). Madrid, Spain: ACS Publications.