LIQUI-PLEX BONDER

TECHNICAL GUIDE

Liqui-Plex® Bonder is a highly consistent, concentrated formulation of 18 essential, plant-available amino acids designed to enhance the crop and mitigate stressors.

By mitigating stressors, optimizing the plant during important growth stages such as pollination, and improving the whole photosynthetic activity, Liqui-Plex Bonder can help the crop protect itself and increase yield.

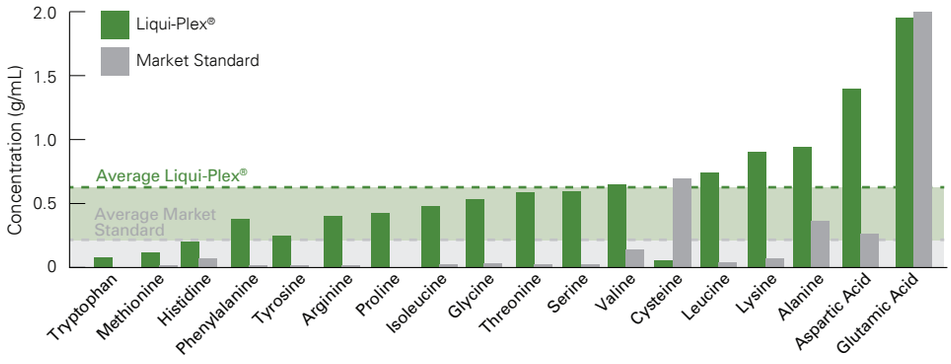
To increase yield, Liqui-Plex Bonder:

- Improves photosynthetic activity by increasing CO_2 uptake and chlorophyll production.
- Optimizes pollination and the plant reproduction process.
- Increases nutrient use efficiency through better uptake of nutrients and movement once nutrients are in the plant.
- Optimizes plant performance during important physiological stages.

To protect yield, Liqui-Plex Bonder:

- Enhances the vitality of the crop so it is better suited to handle abiotic stressors.
- A healthy plant can respond more effectively to stress when it occurs.
- Maintains proper water relations in the plant during stress.
- Helps the plant move nutrients where it needs them through optimized nutrient mobility and uptake.

Check out this quick video on Liqui-Plex Bonder



- **Liqui-Plex Bonder** contains a 100% plant-available formulation of amino acids. Manufactured using a precise fermentation process, the quantities in the chart above are consistent in every batch, every time. Liqui-Plex Bonder is not a byproduct of other manufacturing processes. It is an intentionally produced amino acid product.
- Each amino acid serves a specific purpose in the plant. Below are four examples of key plant processes supported by individual amino acids.

ASPARTIC ACID

Nitrogen source, important during early growth stages, essential for synthesis of other amino acids.

GLYCINE

Aids in photosynthesis, precursor to chlorophyll.

PROLINE

Essential for overcoming environmental stresses such as drought, temperature extremes, salinity, etc.

LYSINE

Important plant nitrogen reserve, chlorophyll activation and senescence delay, stomata regulation and pollen development.

Where our Liqui-Plex products win:

- Stable and stand up to most on-farm storage conditions.
- Can be stored for multiple growing seasons without compromising quality.
- Compatible with most tank mix chemicals.
- Produced in a laboratory setting for high precision, uniformity and consistency with every batch.
- Lower rates of nutrients required - L-amino acids pass straight through the leaf, allowing the nutrients to efficiently reach their target.
- Increased uptake of nutrients because L-amino acids are known to the plant. Plants deliver them where they are needed immediately in hours, not days.

LIQUI-PLEX® BONDER

Rate	16-32 fl oz/A

Crops require different amino acids at each major growth stage. Whether it is cell differentiation, photosynthesis, translocation in the phloem or any other physiological process, Liqui-Plex Bonder has the right amino acids to support the crop.

Natural and efficient complexing agents that are 100% usable by the crop

HELM's amino acids serve as excellent organic complexing agents because they bind with micronutrients in a highly plant-available, environmentally friendly form. These water-soluble, complexed minerals can be quickly and easily absorbed, translocated and metabolized by plants.

Minerals that are complexed by amino acids are 100% usable in hours, not days or weeks, compared to other chelating/complexing agents.

Recovery from glyphosate injury

Glyphosate controls weeds through a series of steps that cause a reduction in aromatic amino acids essential for plant growth. For instance, tryptophan is an aromatic amino acid that is essential for cell division and differentiation that occurs during germination and seed development.

In a 2012 study from the Journal of Plant Nutrition[1], researchers showed that supplementing a soybean crop with additional amino acids could help to prevent injury from a glyphosate application.

GROWTH STAGE	WHAT'S HAPPENING	KEY AMINO ACIDS
Germination and Emergence/ Bud Break	Cell division, cell differentiation, energy conversion and production	Arginine, Valine and Alanine, Tryptophan, Glutamic Acid, Aspartic Acid
Vegetative Growth	Massive cell division, differentiation and elongation. Photosynthesis, structural integrity, water relationships	**High Demand For All Early For Roots** = Valine and Methionine **Late** = All Tryptophan
Reproduction/ Pollination	Flower structure integrity, pollen and pollen tube formation, fertilization. Cell division and cell differentiation	Proline, Glycine, Valine, Phenylalanine, Tryptophan
Bulking and Maturity	Cell expansion in the sink (fruit, grain, etc.). Translocation in phloem, photosynthesis, fruit color	Methionine, Glycine, Alanine, Serine, Proline
Senescence (Deciduous trees and vines only)	Prepare for next spring. Cell division, differentiation flowering and politization	Tryptophan, Histidine, Proline, Arginie, Glutamic Acid, Serine, Glycine, Alanine

[1] *Luiz Henrique Saes Zobiole, Rubem Silvério de Oliveira Junior, Jamil Constantin, Robert John Kremer & Denis Fernando Biffe (2012) AMINO ACID APPLICATION CAN BE AN ALTERNATIVE TO PREVENT GLYPHOSATE INJURY IN GLYPHOSATE-RESISTANT SOYBEANS, Journal of Plant Nutrition, 35:2, 268-287, DOI: 10.1080/01904167.2012.636130*

Geek out on **more** fermentation science:

Give this year's crops the ultimate advantage.
Reach out to your regional HELM sales rep today.

HELM | Alltech CROP SCIENCE

HELM Agro US, Inc.
401 E. Jackson St.
Suite 1400
Tampa, FL 33602

P: 813.621.8846
F: 813.621.0763
connect@helmagro.com