

LIQUI-PLEX

TECHNICAL GUIDE



Liqui-Plex® works to deliver plant-available nutrition.

- **Liqui-Plex Bonder** is a highly concentrated foundational amino acid complexing technology that improves the availability of fertilizers and minerals to the plant. Amino acids are an environmentally friendly alternative to synthetic chelating agents which can help preemptively manage the plant's response to environmental stress and aid in recovery from herbicide injury.
- **Liqui-Plex** micronutrient products are built upon the foundation of Liqui-Plex Bonder technology to deliver quality plant nutrition and provide a natural source of nitrogen. They contain 18 plant available L-amino acids at higher, more consistent concentrations than competitive products.

⊖ unprotected nutrients
⊕ protected nutrients through complexing or chelating

How complexing and chelating agents deliver nutrients efficiently

Ensuring nutrients and minerals reach crops in the right form helps maximize investment. When applied on their own, minerals can have unintended chemical reactions with the environment (e.g. the soil) prior to reaching the plant, resulting in waste. Complexing and chelating agents protect from this by serving as "packaging" to keep the mineral in its desired state until it can reach the correct location.

Amino acids are the base food source of plants and are generated by the plants themselves.

By adding the 18 amino acids in Liqui-Plex, the plant can save energy through not having to be the sole producer of amino acids. Each amino acid delivers different benefits that can help crops reach their genetic potential. Key amino acids include:

ASPARTIC ACID

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

PROLINE

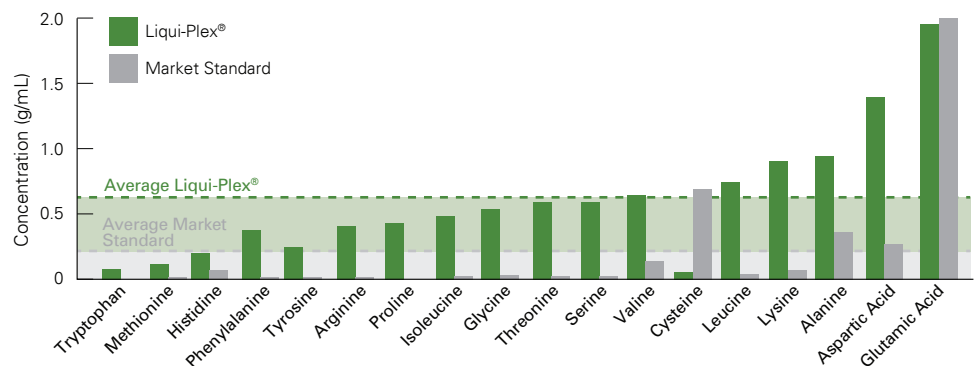
Essential for overcoming environmental stresses such as drought, temperature extremes, salinity, etc.

GLYCINE

Aids in photosynthesis, precursor to chlorophyll.

LYSINE

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



Our amino acids – 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 like other chelating/complexing agents.

Aside from amino acids, EDTA is a common agent for protecting minerals from undesirable environmental interactions.

Amino acids protect nutrients in a more readily plant-available form than EDTA. Here are some of the main differences between the two:

- EDTA's large, synthetic molecules bind securely with minerals, which helps prevent unintended chemical interactions. However, this strong bonding characteristic can be a negative attribute once EDTA is in the plant.
- For example, iron EDTA will help cure iron deficiency in plants, but the EDTA might bind to another molecule to release the iron. Often, EDTA will exchange an iron molecule for manganese molecule, which could lead to a manganese deficiency¹.
- Additionally, synthetic agents such as EDTA can accumulate in the soil over time because they are of no use to the plant and are discarded. In contrast, amino acids can be utilized by the plant once they have delivered their mineral payload.

Biological source of N

Every amino acid molecule contains nitrogen. In addition to delivering critical micronutrients, amino acids are commonly used to supplement or replace other nitrogen sources.

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 products are best used between 16 – 32 oz/acre, depending on crop conditions. They can provide rapid response and recovery from unexpected deficiencies as well as anticipated nutrient shortfalls because of their excellent uptake and plant bioavailability.

Liqui-Plex Bonder is the ready-to-use formulation of Complex-Aid®. These formulations can also come premixed with essential micronutrients (e.g. Liqui-Plex Cu, Liqui-Plex ZnMnB).

Geek out on **more** fermentation science:



Give this year's crops the ultimate advantage.
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¹ Lester, Donald. "Chelated Micronutrients" Maximum Yield USA, September 2010.