

Increase Total Yield and Income!

T-PA™

Fertilizer Availability Extender™

What is First Choice T-PA™?

T-PA™ is a patented fertilizer availability enhancement product. When added to fertilizer, T-PA™ increases the nutrient level in plants by keeping fertilizer available for an extended period of time. (See the root hair development at left).

It is estimated that 30% to 50% of a crop's productivity is attributed directly to fertilizer; but often less than 50% of applied fertilizer is absorbed by the plant.

T-PA™ is a proven fertilizer additive when used with a balanced fertilizer program delivers healthier, stronger plants with faster maturity and higher yields.

T-PA™ is Proven!

Implementing the use of T-PA™ increases efficiency of traditional nutrient management programs. T-PA™ has been researched and agronomically proven to increase yields on over 50 crops across North America since 1996. There are a minimum of 13 different US patents referring to the agronomic benefits of using T-PA™.

How does T-PA™ work?

T-PA™ increases crop yields by protecting the phosphorus fertilizer. Phosphorous has a negative charge while calcium, magnesium, iron and aluminum all have positive charges.

When phosphorous fertilizer is applied in soils or water, without T-PA™, most of the negative charged phosphorus is attached to the positive charged calcium, iron or aluminum preventing its absorption by the crop. This dramatically reduces the efficiency of the applied phosphorus.

When T-PA™ is added, because it has a large negative charge, it attaches to the positive charged calcium, iron or aluminum that ordinarily would bind with the phosphorus, thereby leaving the phosphorus free to be taken up by the plant.

T-PA™ keeps both the applied nutrient and the natural nutrients in the water source more available for plant uptake by not allowing this attraction to occur.

T-PA™ also reduces the amount of "scaling" or precipitants that build up in a sprayer or irrigation system.



How does T-PA™ affect crops?

In many crops the root system of treated plants will have more root branching and longer root hairs, which enables them to make greater use of available nutrients (fertilizer). With nutrients readily available, plants develop easier and faster.

Early and fast growth can help overcome the stress from drought caused by heat and/or low moisture levels. Early plant development also speeds maturity, which can make a big difference in the profit or loss from your crop.

T-PA: Effects on Root Morphology

Dr. F. Below, U. of Illinois

	Root Hair Length (mm)	Lateral Branches Per Plant
100% Nutrient Strength + 0 PPM T-PA	0.53	220
100% Nutrient Strength + 100 PPM T-PA	0.71*	219
	Seminal Roots (cm)	Lateral Branch Length (cm)
100% Nutrient Strength + 0 PPM T-PA	29.1	3.6
100% Nutrient Strength + 100 PPM T-PA	35.2*	4.3*

* Indicates Significant Difference at the 95% level of probability.

Summary of T-PA Yield Enhancement

18 Crops- 230 Trials – 22 states

Crop	# Trials	Yield Incr.	Crop	# Trials	Yield Incr.
Alfalfa	1	3,355#	Potatoes Can	13	76 cwts
Field Corn	46	11.4 bu.	Potatoes ID	4	55 cwts
S. Corn	22	9.1%	Potatoes WI	6	25 cwts
Bell Peppers	5	150 boxes	Rice	1	\$101/acre
Sugar Cane	1	591#	Snap Beans	10	\$122/acre
Cotton	31	211 #	Sugar Beets	9	\$64.57/ac.
Collards	1	20.3%	Silage Corn	14	1.94 tons
Citrus	5	1.55Tns	Sorghum	6	22 bu.
Onions	9	27.9%	Dry Beans	9	\$56.64/acre
Tomatoes FL	16	259Bxs	Lettuce	2	19.1%
Tomatoes CA	19	13.2%			

T-PA™ (thermal polyaspartate) is a patented synthetic protein produced from the amino acid, aspartic acid. Characteristics of the anionic protein include a high cation exchange capacity arising from the carboxyl group of amino acids (approximately 750 mill equivalents). Molecular weight is approximately 5000.

University - Corn Trials 1996-1999

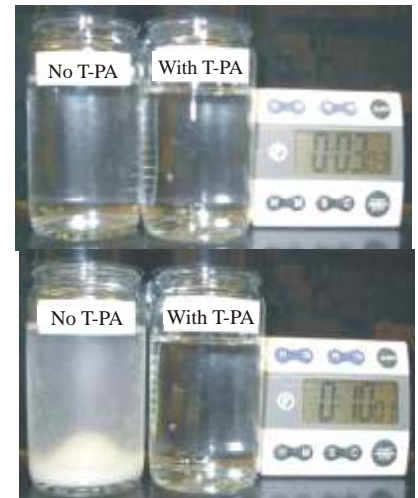
46 total trials	Application of T-PA increased overall yield 11.35 bushel per acre
11 trials	2 quarts T-PA applied with starter fertilizer at planting increased average yield 16.0 bushel per acre
7 trials	1 quart of T-PA applied with starter fertilizer at planting increased average yield 12.3 bushel per acre
16 trials	1 to 11.4 quarts T-PA broadcast increased yield an average of 8.6 bushel per acre
5 trials	2 quarts split applied, (starter and sidedressed) increased yield 7.7 bushel per acre
4 trials	2 quarts sidedressed increased yield 8.2 bushel
3 trials	2 quarts T-PA banded between or over rows increased yield 12.0 bushel

T-PA Effectiveness

T-PA™ is a crystal growth inhibitor that delays the formation of insoluble, unavailable precipitates which consume both cationic and anionic nutrients. As a result, much higher levels of soluble nutrients are available to plants.

The slides (right) demonstrate the mixing of calcium chloride and ammonium sulfate solutions without T-PA™ and with one drop of T-PA™. In the mix that does not contain T-PA™ the positively charged calcium attracts the negatively charged sulfate to form insoluble calcium sulfate.

When this occurs in soil solution, both calcium and sulfate become unavailable to plants. In the presence of T-PA™, no precipitate forms. Therefore, calcium and sulfate remain in the soil solution in soluble form and can be more available to plants.



T-PA Testimonials

"By using T-PA in sandy soil with low organic content, we saw a very positive result from petiole tests. It seemed to hold the phosphate at a high level 2-3 weeks longer." - Wayne Ganser, VP Sales, Research and Development, Jay-Mar Inc.

"Because of our high calcareous water, a lot of times we clogged sprinkler systems when we added 10-34 to irrigation water. By adding T-PA™ to the 10-34 we have eliminated this problem. It also really helps foliar uptake of micronutrients in potatoes as we can tell by the stable petioles." - Garth Heidel, WFS Branch Manager, Burley, Idaho

"We've seen enhanced uptake of 2-3 primary nutrients in our onions and tomatoes. We had fields with long-term phosphate problems, but after using T-PA, the problem went away. We're real happy with the performance of T-PA." - Russ Keegan, WFS Branch Manager, Mettler, CA

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Benefits of T-PA™ to Grower

- Enhanced nutrient uptake
- Enhanced availability of soluble nutrients for plant uptake
- Complexes Calcium to reduce fertilizer precipitation in soil and water
- Increased plant health by keeping phosphate fertilizer available to young plants
- Consistent return on investment
- Flexible application with liquid and dry formulations

Usage Rates and Recommendations

- Add to starter, pop-up, and side-dressed fertilizer @ 1-2 quarts/acre
- Add to phosphate fertilizers being applied through irrigation system @ 1-4 pints/acre
- Add to foliar fertilizer applications @ 1-4 pints/acre
- ALWAYS ADD T-PA™ WHEN APPLYING PHOSPHATE FERTILIZERS**

Facts you should know about T-PA™

- It is not crop specific
- It is non-toxic to humans, animals, aquatic and terrestrial plants
- It is not harmful to beneficials
- It is biodegradable
- It is easy to mix and apply with fertilizer using standard equipment and irrigation systems.
- ROI of 10:1 or higher is possible

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