

Armament®

AN AID FOR NITROGEN (AND POTASSIUM)

SOIL SURFACE

Urea on the soil surface is under tremendous pressure from high concentrations of urease enzymes. High levels of this enzyme on the soil surface create an environment where urea is converted to ammonia gas (NH₃) and carbon dioxide. Unless the ammonia gas reacts with water to form ammonium, the ammonia will be lost to the atmosphere. As a water soluble amino-acid polymer, Armament coats the urea prills, and helps to stabilize them. Recent research from Purdue University showed that Armament reduced ammonia volatilization by 65% in the first three days.

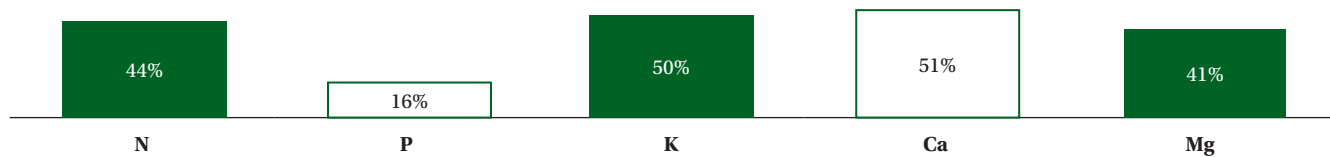
Treatment	days after application		% volatilization prevented
	2	3	
	cumulative NH ₃ volatilized, mg		
untreated urea	75	104	—
Armament (½ gal per ton)	26	37	64.42%

Purdue University

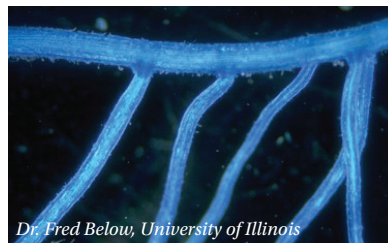
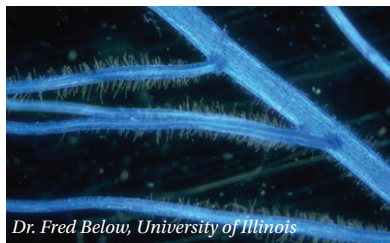
IN THE SOIL

In the process of urea converting to ammonium, the ammonium levels build-up dramatically. This creates issues as the negatively-charged soil colloids and mineral complexes in the immediate area where the urea prills were begin to fill up. Once the negative sites are all filled up, two things happen: (1) Either the ammonium begins to move deeper in the soil away from the concentration (and possibly away from the growing area of plants' roots) and/or (2) ammonium begins to displace potassium (as they have a similar molecular radius), leaving potassium unattached, prone to movement away from the roots, and eventually at risk to become immobile as a mineral complex. Research from The University of Illinois shows that both nitrogen and potassium uptake into the plant increase by 44% and 50% respectively.

Root Hair Visual (below) Translated To Increased Nutrient Uptake (Wheat)



Dr. Fred Below, University of Illinois



Left: Plants treated with a standard nutritional program and Armament.

Right: Plants treated with a standard nutritional program and urea.

With an increase in overall nutrient uptake, as well as an increase in the health of the soil biology at the rhizosphere due to the short-term and long-term food sources, Armament improves soil and nutrient conditions for better overall root growth.

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IN THE SOIL (CONT.)

Research from Texas A&M University shows an increase in nitrogen uptake of 29.7% and an increase in potassium uptake of 36% in bermudagrass when applied at 16 ounces per acre with urea and potassium chloride.

Armament on Bermudagrass (N)

oz. Arm/A	% N in Forage	Total N Uptake/A	% N Use Efficiency	Percent Increase
0	1.64%	49.7	49.7%	—
16	1.76%	64.5	64.5%	29.7%
48	2.01%	64.9	64.9%	30.4%

Texas A&M University

Armament on Bermudagrass (K₂O)

oz. Arm/A	% K in Forage	Total K ₂ O Uptake lbs/A	% K ₂ O Use Efficiency	Percent Increase
0	1.96%	71.3	118%	—
16	2.21%	97.2	162%	36%
48	2.61%	101.1	169%	41%

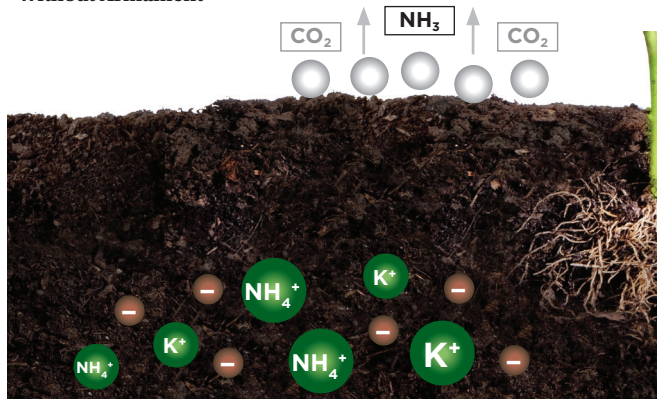
Texas A&M University

CONCLUSION

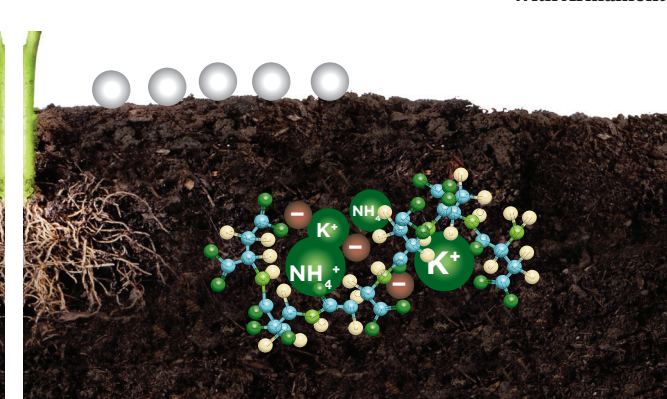
With documented issues with nitrogen stability and movement in the soil, Armament works to stabilize nitrogen both on the surface of the soil and in the profile of the soil. With the relative low use rate, and with the proven performance in the lab and in the field, Armament continues to be an attractive additive in nutritional programs.

HOW ARMAMENT WORKS

Without Armament



With Armament



Armament is a negatively-charged (anionic), biodegradable amino-acid polymer that is polymerized from L-aspartic acid, a natural amino acid synthesized in plants. Armament helps to reduce volatilization on the surface and adsorbs ammonium in the soil, allowing for an increased uptake of nitrogen in the plant. By providing more areas of adsorption for the ammonium ions, it indirectly helps increase the uptake of potassium in plants as well.