

# ENHANCED EFFICIENCY NITROGEN FERTILIZER REFERENCE GUIDE FOR AGRICULTURE:

Below is a breakdown of types of enhanced efficiency nitrogen fertilizer (EEF) products available for use in crop production, and a basic overview of their features and benefits.

PRODUCT CLASS	MODE OF ACTION	PRODUCT FORM	FEATURES	PRODUCTS AVAILABLE*
<b>Inhibitors and Stabilizers</b>	<p><b>Inhibitors:</b> chemical inhibition of N transformation in soil</p> <p><b>Urease inhibitors:</b> slow conversion of urea to ammonia; most common active ingredient is NBPT</p> <p><b>Nitrification inhibitors:</b> slow conversion of ammonium to nitrate; most common active ingredients are nitrapyrin and DCD</p>	<p>Liquid, dry granular, soluble or wettable powders</p> <p>Complete products or dealer applied additives</p>	<p>Urease inhibitors protect against ammonia volatilization for 1-2 weeks</p> <p>Nitrification inhibitors protect against leaching and denitrification for 4 – 8 weeks.</p> <p>Minimal additional seed safety for seed-placed N</p>	<p><b>Urease inhibitors:</b> Agrotain®, Agrotain Plus®, Super U®, Contain™, Arborite AG-NT®, Factor, N-Fixx PF, NitroGain®, N-Veil, NutriSphere-N®, Ca-, NH4-, K-thiosulfate, NZone™, Stay-N®</p> <p><b>Nitrification inhibitors:</b> N-Serve®, Instinct®, Agrotain Plus®, Super U, Guardian®, Entec, Nutrisphere-N®, Ca-, NH4-, or K-thiosulfate</p>
<b>Slow-Release Fertilizers</b>	<p><b>Sulphur-Coated Urea (SCU) and Polymer-Coated Sulphur-Coated Ureas (PCSCU's):</b> Release N by physical or biochemical breakdown of the coating. Release time determined by coating thickness and biological activity</p>	Coated granular fertilizer, complete products	<p>Protects against: ammonia volatilization, leaching and denitrification</p> <p>Release times of 4-12 weeks Less predictable release curves; potential lock-off (incomplete release)</p> <p>Safe for seed placement at greater rates than conventional N</p>	<p>SCU (generic), XCU®, Poly-S, Poly Plus</p> <p>Not widely used in broadacre agriculture.</p>
	<p><b>Urea Reaction Products:</b> Complex urea (or nitrogen containing molecules) are biologically decomposed by soil microbes or hydrolyzed by contact with water. Release rate determined by complexity of molecules and biological activity</p>	Liquid, dry granular form, complete products	<p>Protects against: ammonia volatilization, leaching and denitrification</p> <p>Release time of a few weeks to months</p> <p>Liquid materials generally have the shortest release times</p>	Nitamin®, NFusion®, CoRoN®, N-Sure®, Nortrace® NPact®, Trisert®, Nitroform®, Nutralene®, generic methylene urea
<b>Controlled-Release Fertilizers</b>	Polymer coated urea granule releases N by diffusion through coating when in contact with water. Release rate controlled by coating thickness and type; and by soil temperature	Complete dry granular products. Coating applied at the point of manufacturer	<p>Protects against: ammonia volatilization, leaching and denitrification; controlled rate of nitrogen feeding to crop</p> <p>Release time of a few months to a few weeks. Most predictable N release</p> <p>Safe for seed placement at two to three times the safe rate of conventional N</p>	<p>ESN® SMART NITROGEN®, Duration®, Polyon®, Gal-XE ONE™, Multicote™, Nutricote™, Florikote™, Agroblen®, CoteN™</p> <p>Only ESN® SMART NITROGEN® is widely used in broadacre agriculture</p>

The above information is based on an overall market analysis. \*Product list includes most common products available in North America and is not all-inclusive.

ESN provides the greatest return for each dollar invested in fertilizer protection of any nitrogen source available on the market for agriculture.

ESN provides the best protection against N-loss mechanisms and delivers season-long nitrogen.

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