

Growing with Confidence

Smart fertility products from Agrium Advanced Technologies

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Agrium Advanced Technologies – SMARTER WAYS TO GROW™

When it comes to fertility products, Agrium Advanced Technologies (AAT) is leading the way. A manufacturer and marketer of controlled release fertilizers and micronutrients, AAT agricultural solutions are on the forefront of environmentally friendly technology. And these solutions give growers an innovative way to achieve higher yields and optimum quality.

AAT is a strategic business unit of Agrium Inc., a major retail supplier of agricultural products and services in North and South America – as well as a global producer and marketer of agricultural nutrients and industrial products. AAT products meet the needs of customers in agriculture, professional turfgrass, horticultural, consumer lawn and garden and specialty agriculture markets around the world.

AAT Mission: To provide ingredients for growth.

AAT Vision: To be the global leader in providing environmentally sound, high performance plant growth technologies.



What is a Smart Fertility Product?

Innovative. Productive. Sustainable. Flexible.

A Smart Fertility product from AAT is a unique tool for growers to achieve higher yields and better quality – all the while respecting the environment. Smart Fertility products include ESN, a controlled release urea fertilizer, and Ultra Yield, a highly water-soluble source of granular secondary and micronutrients.

ESN® – Environmentally Smart Nitrogen

ESN makes use of the most advanced N technology available. A unique polymer coating encapsulates a urea granule, protecting the nitrogen inside from environmental losses. It releases the nitrogen based on soil temperature and moisture, delivering N to the growing plant when it's needed most.

Now that's smart.

Ultra Yield® – Essential Micronutrients

Ultra Yield micronutrients are a complete line of granular micronutrients used to promote effective nutrient management and maximize crop production. Formulated to deliver key nutrients such as iron, zinc, manganese and copper, these nutrients are an essential supplement to a regular fertility program.

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Understanding ESN Technology



Understanding ESN Technology

Smart for your crops. Smart for your business.

ESN technology maximizes nitrogen use efficiency and gives your nitrogen the ability to “think for itself.” The controlled release technology releases N based on soil temperature and moisture, providing N during the optimal conditions for plant growth. In addition, ESN technology protects your investment in N from loss to the environment.

What makes ESN technology so smart?

- **Maximize yield** – ESN technology has been proven to increase yield in a variety of crops across a range of geographies. Yield benefits have been shown to be greatest in areas where the potential for N loss is higher.
- **Maximize quality, including protein content** – In wheat, ESN technology has been proven to increase protein content. In potatoes, the increase has been shown in percentage of #1s, in corn silage the result is in energy value and in other crops it is simply overall quality.
- **Safe for your crop** – For seed row placed N applications, ESN technology allows for placement of up to three times the safe rate of urea.
- **Reduced applications/increased application window/convenience/ease of use** – ESN technology allows for the flexibility to reduce multiple N applications and widen your application window. It is compatible with no-till operations, is easy to blend and will not set-up in storage – which provides a longer shelf life for your fertilizer.
- **Safe for the environment/government subsidies** – ESN technology virtually eliminates N loss, providing significant benefits to the environment. In fact, US programs, including the national NRCS Conservation Stewardship Program and local EQIP programs offer grower incentives for the use of ESN technology. To find out more, visit www.AgriumAT.com/nrcs.
- **Backed by independent research** – ESN technology has been subjected to over 400 crop years of testing across a variety of geographies and soil types by independent, third-party researchers. Our data is driven from this vast library of research.
- **Trademark color** – ESN technology is easily recognized by its green color – it’s your guarantee that you’ll get the technology you ask for.



How ESN technology works

Coated nitrogen granules

ESN technology uses a flexible, micro-thin polymer coating to encapsulate an N granule. The coating protects the N from loss mechanisms, releasing it when the crop needs it most.

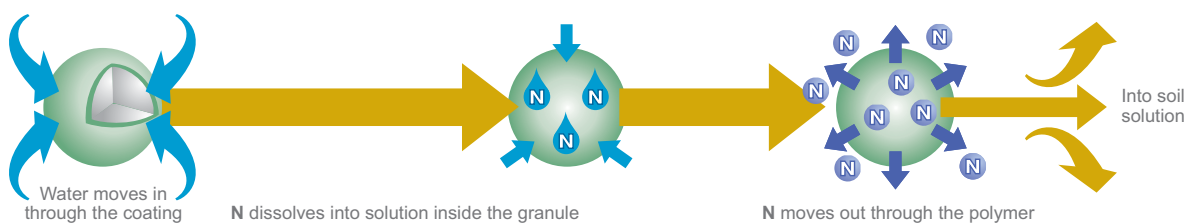
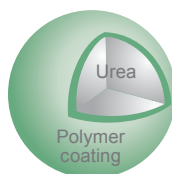
Temperature controlled release

The unique polymer membrane allows water to diffuse into the granule, dissolving the N inside and becoming a water and urea solution.

The same growing conditions that favor plant growth and nutrient demand are the conditions that release N from the polymer coating: moisture and temperature. Moisture creates the N solution inside the coating, which that moves through the coating at a predictable rate that is based on soil temperature. This highly efficient process matches the N demand of the growing crop.

Why use ESN to maximize your nitrogen efficiency?

ESN technology provides a significant return to the grower through increased nitrogen efficiency. Higher yields and quality, reduced application costs, the flexibility of a wider application window and the potential for government use incentives all put more money into profit. In addition, ESN technology provides a safe, environmentally friendly alternative to traditional N use.



Research data and performance expectations

Each year ESN is extensively tested on a variety of crops in plot tours and field trials across North America. ESN is backed by over 400 crop years of independent, third party research data which has focused on corn, wheat, potatoes and canola. AAT will continue to expand this research to include other crops, because any crop that uses N can potentially benefit from ESN technology.

Corn: In areas with higher potential for N loss, ESN has shown yield increases of up to 40 bu/ac compared to conventional N practices. The average yield increase across our research data in these areas is 15-20 bu/ac.

Wheat: Across all our research data, ESN has shown the ability to increase wheat yields up to 30 bu/ac, with an average increase of 4-6 bu/ac. In addition to increased yield, ESN generates an increased in protein content of up to 1.5% in some varieties. The average protein content increase recorded is between 0.5-1.0%.

Potatoes: Potatoes exhibit one of the best responses to ESN. Marketable yield increases have reached 30% and averaged 5-10%. In addition, the percentage of #1 rated potatoes has been shown to increase up to 25%, with an average increase of 0-10%.

Canola: By using ESN as 50-70% of your N blend, canola yield has been shown to increase an average of 8-10% vs. traditional practices. An added benefit is being able to place N with the seed at rates up to three times the safe rate of urea.

Your source for more information is SmartNitrogen.com

When it comes to informing your customers about the benefits of ESN technology, we've developed a collection of online resources and more detailed information to help explain the benefits of this smart fertility product.

Crop specific fact sheets

Individual crop sheets outline the research-supported benefits of ESN, as well as other information, by crop. The following sheets can be individually downloaded:

- Canola
- Spring and Winter Wheat
- Potatoes
- Corn

Other fact sheets

- How ESN Technology Works
- Environmentally Smart Nitrogen



Corn

ESN technology goes beyond traditional nitrogen

- Maximum N use efficiency
- Maximum yield

Potatoes

ESN technology goes beyond traditional nitrogen

- Maximum N use efficiency
- Maximum yield
- Ideal application window, improved convenience and ease of use
- Safe for the environment, government purchase incentives may apply
- Backed by independent research

ESN technology for potatoes

Potatoes require high Nitrogen, and timing is critical. The crop consumes 60 to 80% of its total N needs during tuber initiation and tuber bulking. ESN technology controls N loss by applying only the growing plant's need for N. Additionally, it usually optimizes N loss to the environment. Using ESN technology is a smarter way to grow.

Spring and Winter Wheat

ESN technology goes beyond traditional nitrogen

- Maximum N use efficiency

Canola

ESN technology goes beyond traditional nitrogen

- Maximum N use efficiency
- Maximum yield
- Ideal application window, improved convenience and ease of use
- Safe for the environment, government purchase incentives may apply
- Backed by independent research

ESN technology for canola

Stop growth when you're ready to harvest. Control N loss by releasing N only when you're ready to harvest. ESN technology controls N loss, reducing N loss and increasing profitability. Additionally, it usually optimizes N loss to the environment. Using ESN technology is a smarter way to grow.

Additional research and information

Additional field trials, plot trials and grower testimonials are available at **SmartNitrogen.com**. If you would like to see certain data or have suggestions for locations or studies for your area, contact your local AAT representative.

Handling recommendations

ESN was developed and extensively tested to resist the effects of normal handling. Excessive handling can affect the coating and N release.

Application timing

ESN is generally applied at rates similar to conventional N fertilizers. Field location, weather conditions, timing of N demand and potential for N loss are all factors to consider in determining the most appropriate application timing.

NOTE: For potatoes, location, variety and traditional application practices can greatly affect the recommended use of ESN. See **SmartNitrogen.com** or talk to your AAT representative.



Ultra Yield
Micronutrients

Ultra Yield Micronutrients



Ultra Yield Micronutrients

Highly water-soluble. Maximum coverage.

About micronutrients

Micronutrients are naturally occurring elements in the soil that growing plants require. The natural supply is often low, which can limit crop growth and yield potential. When matched to soil and crop need, micronutrients can correct deficiencies, enhance photosynthesis, improve plant enzyme systems, regulate flowering and seed development and even regulate the conversion of N to protein.

Benefits of water solubility

When it comes to choosing micronutrients, their water solubility is critical. The real benefit of any nutrient is the amount available to be taken up by the crop. Research indicates that there is a minimum water solubility level of approximately 40% required for effective plant uptake. In addition, plants receive minimal incremental benefit from water solubility levels above 70%. Micronutrients with water solubility levels below the 40% minimum require increased application rates to ensure effectiveness.

Benefits of maximizing coverage

Micronutrients move very little once they are in the soil. As a result, plant roots must intercept the micronutrient solution to receive the benefit. Lower analysis products with increased application rates help ensure more of your crop receives these essential nutrients.

Ultra Yield micronutrients combine high water solubility with lower analysis to ensure efficient uptake by plants and maximum coverage for your fields.

Blends and packages

Ultra Yield micronutrients from Agrium Advanced Technologies (AAT) deliver maximized production, each and every time. Manufactured with the highest quality inputs, Ultra Yield micronutrients are available with either high water-solubility or low analysis for maximum agronomic effectiveness – or with lesser water solubility and high analysis for a combination of agronomic effectiveness and logistical inventory and handling needs.

- Color coded bags for easy product identification
- Specially formulated grades for convenient blending
- Screened to a targeted SGN of 250
- Available in 50 lb/25 kg bag, or 2000 lb/1 MT tote
- Environmentally screened and treated with a superior dust-control coating

Product offering

Product Group A	N	Minimum W/S	Analysis
UY Bean Mix	2%	35% MN	2% N, 20% Mn, 4% Zn, 1% B, 9% S
UY Corn Mix	2	50% Zn	2% N, 20% Zn, 4% Mn, 1% B, 1% Cu, 9% S
UY NuBor 10	0	80% B	10% B, 10% Ca, 5% Mg, 1.5% S
UY BroadMan 20	2	60% Mn	2% N, 20% Mn, 12% S
UY Copper 12	2	65% Cu	2% N, 12% Cu, 6% Zn, 13% S
UY Iron 20	2	75% Fe	2% N, 20% Fe, 11% S, 1.5% Zn
UY EZ20	2	70% Zn	2% N, 20% Zn, 14% S

Product Group B	N	Minimum W/S	Analysis
UY Copper 20	1	30% Cu	1% N, 20% Cu, 10% Zn, 6% S
UY Iron 50	1	5% Fe	1% N, 50% Fe, 3% S, 1% Zn
UY Magnesium 36	1	20% Mg	1% N, 36% Mg, 6% S
UY Manganese 27	1	40% Mn	1% N, 27% Mn, 6% S
UY Zinc 40	1	35% Zn	1% N, 40% Zn, 8% S

In addition, AAT can manufacture custom micronutrient blends that are customer, crop, or geography-specific.



Appendix

Grower Testimonials

"I've been using ESN on my better acres and I've had good luck with it. It saves me a trip by incorporating it with the fertilizer. Crops with ESN seem to hold their color better and get the nitrogen when it's needed better than with anhydrous."

Mike Anderson
Oakland, Illinois

"I first started using ESN on my corn in 2005, and weighed three different strips in three different farms. I couldn't see a difference but it was good corn all the way through. But when the checks came in, we had 10 to 20 bushel yield advantage to the ESN field."

Mike Anderson
Oakland, Illinois

"In low ground where you would expect nitrogen to leach with the anhydrous, I always had a yellow cast to the crop. Spring applied anhydrous with heavy rain always had heavy leaching. But ESN, even applied in fall, in the same area was green right through the entire field so you know it's working where it's supposed to."

Gale Bowlen
Coals County, Illinois

"We see significant advantages from ESN applications in spring. Farmers with fall applied nitrogen are now asking us to go back over their fields with ESN. There is a definite difference between spring and fall applied ammonia and ESN."

Greg Dice
Crop Production Services, Oakland, Illinois

"ESN saves us time. We didn't put down any fertilizer or anhydrous in the fall, we do it all with ESN in the spring. One application and you don't have to worry about it."

Tony Coffee
Ashmore, Illinois

"We've used ESN for two seasons and had nothing but good luck. We have to put Nitrogen in the seed row because a double-shoot system doesn't work under our dry conditions. In the past, we applied as much seed-row nitrogen as soil moisture would allow, and then top-dressed. Now we're putting all of our ESN in the seed row because safety isn't an issue. We haven't seen any indication of damage and we're also saving the application expense of topdressing. Higher yield potential, safety and ease of use far outweigh the additional cost."

Bruce Doenz
Warner, Alberta

"ESN makes a lot of sense to us. Plants use it more efficiently, and it's better for the environment. We put 60 pounds of actual N in the seed row, 75% of which was ESN and didn't see any crop damage. Our agronomist said plant counts were excellent. Some fields went as high as 75 bushels per acre, and our average yield was 55 bushels. It was the best crop of winter wheat we've had in three years. ESN is a heck of a nice product."

Joe Waldner
Field Manager
Prairiehome Colony
Wrentham, Alberta



Retailer Resources

“We used ESN in a balanced blend on both wheat and canola, and were extremely happy with crop development. Plant growth was very even throughout the summer, and the crops held in despite some hot, dry weather in July and August. From our experience with seeding into pea stubble and on land that has received manure over the years, we know that slow-release nitrogen works well. Given the conditions, wheat and canola that we fertilized with ESN did much better than we expected.”

Lee Erickson
Donalda, Alberta

“We used considerably less Nitrogen than we usually apply and still got an excellent canola crop. Yield ran about 45 bushels per acre. To get that sort of yield, we’d probably need 100 pounds of actual nitrogen. With ESN, we put on 60 pounds, all of it with the seed. So ESN saved us both time and money, and we didn’t see any damage which is another huge benefit. ESN is also a uniform product that is very nice to handle.”

Scott Rose
Carroll, Manitoba

AAT offers a whole portfolio of sales tools and product knowledge for ESN and Ultra Yield.

SmartNitrogen.com offers crop specific fact sheets and product knowledge that you can share with your growers.

The Smart Fertility Kit is a retailer package designed to provide you with all the tools you need to have ESN and Ultra Yield become an important part of the business solutions you can offer your growers. These kits are available through your local AAT Representative.

To contact the field representative in your area go to **AgriumAT.com/AgContacts**.



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Only from Agrium Advanced Technologies.

AgriumAT.com

SmartNitrogen.com

UltraYield.com

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