eNtrench™

Optinyte™ technology

NITROGEN STABILIZER

Frequently asked questions

1. IS NITROGEN LOSS REAL?

Yes, nitrogen loss is real. Over 35 years of research and soil test trials conducted show that using a nitrogen stabilizer like eNtrench™ can reduce leaching (washing away) by 16%* and denitrification (gassing off) by 51%* on average.

When nitrogen is stabilized with eNtrench, nitrogen retention increases. Corteva Agriscience research trials combined over the past years show that on average 28%* more nitrogen is available in the root zone where plants need it the most. This results in corn yields 7%* higher, wheat yields 6%** higher and canola yields 8%** higher, on average.

2. WHAT HAPPENS TO APPLIED NITROGEN?

After application, nitrogen sources in the ammonium form (NH_4^+) convert to the nitrate form (NO_3^-) via a process called nitrification.

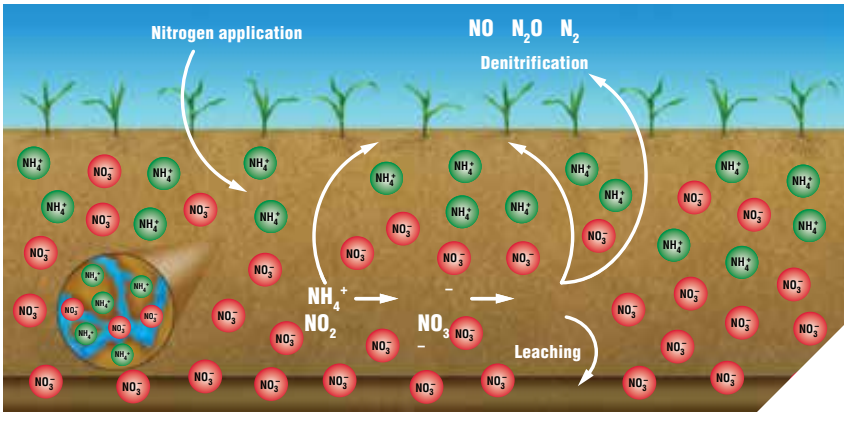
Temperature-sensitive Nitrosomonas soil bacteria convert NH_4^+ to the nitrite form NO_2^-.

Another bacterium, Nitrobacter, then converts nitrite NO_2^- to the nitrate form NO_3^-. These soil microbes become more active when soil temperatures reach 10°C and higher.

Soil has a negative charge and does not form strong bonds with negatively charged nitrates. Nitrates not readily taken up by the plant are prone to leaching away from the root zone and denitrification into the atmosphere, and are therefore unavailable for the plant when required.

Crops use nitrogen in two forms: ammonium NH_4^+ and nitrate NO_3^-.

- The ammonium form (NH_4^+), can be used by plants and is more stable in the soil.
- The nitrate form (NO_3^-), can be used by plants but is more likely to be lost to leaching and denitrification.



CORTEVA™ agriscience

Frequently asked questions

3. WHAT ARE LEACHING AND DENITRIFICATION?

Leaching is the loss of nitrates to the soil below the root zone due to rain and irrigation. Since soil and organic matter also are negatively charged, the nitrates are repelled and can be easily washed away, especially in coarse, sandy soils.

Denitrification refers to the loss of nitrogen when soil microbes convert nitrates to gaseous forms that can escape into the atmosphere as a greenhouse gas. Denitrification affects nitrates, not ammonium.

4. WHAT EXPERIENCE DOES CORTEVA AGRISCIENCE HAVE WITH NITROGEN STABILIZERS?

Corteva Agriscience has been the leader in nitrogen stabilization in the US for over 35 years.

5. WHAT DO CORTEVA AGRISCIENCE NITROGEN STABILIZERS DO?

eNtrench is a nitrification inhibitor. eNtrench is designed for use with UAN, liquid manure and dry urea.

6. WHAT ARE NITROGEN STABILIZERS AND HOW DO THEY WORK?

There are three different types of nitrogen stabilizers:

• Slow Release • Urease Inhibitors • Nitrification Inhibitors

SLOW RELEASE is urea coated with synthetic polymer. Water diffuses through the coating, dissolves the urea pellet and liquid N diffuses out. It is ideal for seed placed nitrogen as it is quite safe next to the seed. The downside is that the nitrogen is only available once the breakdown of the coating has taken place. ESN® is an example of slow release.

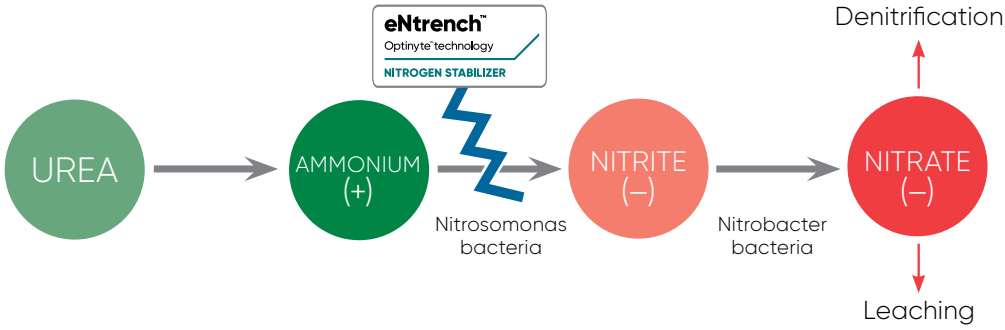
UREASE INHIBITORS inhibit the urease enzyme which catalyzes the hydrolysis of urea left on the soil surface. Any small amount of soil moisture causes unprotected urea to hydrolyze and convert to ammonium and carbon dioxide which may then be lost through volatilization. Urease inhibitors only provide benefit when the urea is on the soil surface. If you seed place your urea, then urease inhibitors offer little benefit. An example of an urease inhibitor is Agrotain®.

NITRIFICATION INHIBITORS inhibit the Nitrosomonas bacteria, which initiate the conversion from ammonium nitrogen (NH_4^+) to nitrate nitrogen (NO_3^-). They slow the conversion of ammonium to nitrate by inhibiting the first stage of nitrification to store usable nitrogen at the root zone. eNtrench is an example of nitrification inhibitor.

Frequently asked questions

7. ENTRENCH, NITRIFICATION INHIBITOR, HOW DOES IT SPECIFICALLY WORK?

Nitrapyrin is the active ingredient in eNtrench. It inhibits the activity of the Nitrosomonas bacterial for up to 10 weeks. By allowing the nitrogen to stay in the ammonium form (positively charged) longer, this product decreases nitrogen loss from leaching and denitrification and instead stores it in the root zone for optimal plant use.



8. DOES ENTRENCH TIE UP MY NITROGEN?

eNtrench does not "tie up" nitrogen. It protects nitrogen by keeping it in a positive ammonium form, in the root zone, longer so it is available for plant use and less likely to be lost to leaching or denitrification. It inhibits the nitrifying bacteria allowing the nitrogen to be stored at the root zone for optimal plant use.

9. WHY WOULDN'T I JUST INCREASE MY NITROGEN BY ADDING ANOTHER $10–$15 WORTH OF NITROGEN?

The amount of nitrogen you apply needs to be based on sound agronomics – too much or too little can both cause problems. The key is to apply the proper amount and protect it, for the most efficient use of your investment. Applying more nitrogen does not ensure there will be enough when the plant requires it (i.e. heavy rains, warm temperatures will increase the speed of denitrification). It's like having a hole in your fuel tank; you wouldn't just keep pouring gas in. You would protect the gas in the tank by repairing the hole to stop the loss.

Frequently asked questions

10. WHAT ARE THE BENEFITS OF ENTRENCH NITROGEN STABILIZER?

eNtrench Nitrogen Stabilizer:

Protects your investment

- Keeps nitrogen in the root zone for optimum plant use by decreasing the loss of nitrogen through leaching and denitrification.

Optimizes opportunity for yield and profit

- 28% more positive nitrogen available in the root zone.*
- Corn yields increased by 7% on average.*
- Wheat yields increased by 6% on average.**
- Canola yields increased by 8% on average.**

Manages time and efficiency

- Fall application saves time in spring for seeding.

Expands your application options

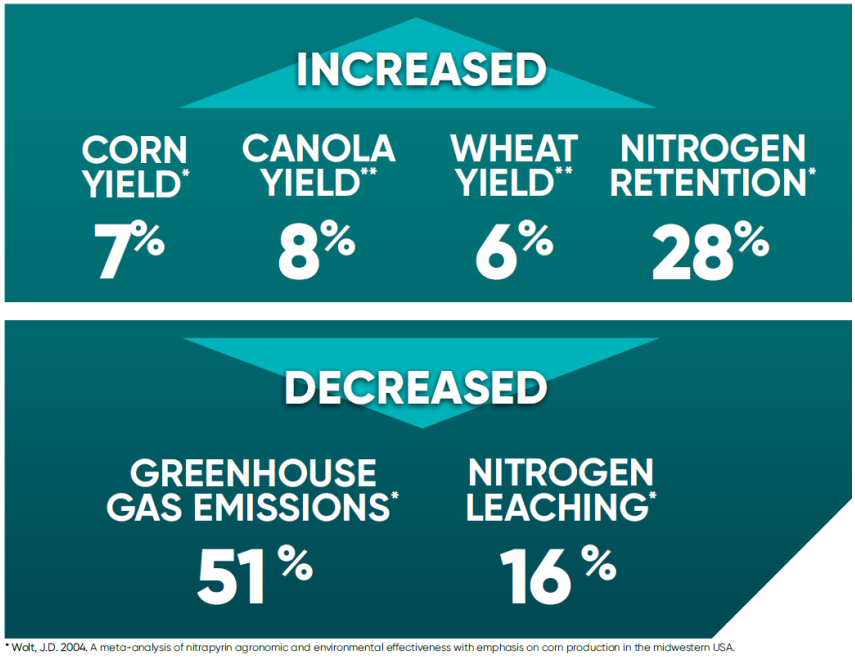
- Take advantage of lower fall fertilizer prices and gain on-farm in-field storage.

Reduces environmental impacts

- Reduces leaching of nitrates on average by 16%.*
- Reduces denitrification on average by 51%.*

11. IS THERE DATA TO DEMONSTRATE THAT ENTRENCH PROTECTS NITROGEN AND KEEPS IT IN THE ROOT ZONE LONGER?

Canadian data has proven that there is a consistent yield increase over time by using eNtrench. These yield gains are due to eNtrench decreasing denitrification by 51% and leaching by 16% which leads to an average of 28% more nitrogen retained in the root zone through out the growing season.



* Walt, J.D. 2004. A meta-analysis of nitrapyrin agronomic and environmental effectiveness with emphasis on corn production in the midwestern USA.
**Based on Corteva Agriscience Canada research trials.

Frequently asked questions

12. WHAT CROPS CAN I USE ENTRENCH ON?

eNtrench is approved for use in canola, corn and wheat.

13. WHAT IS THE RATE FOR ENTRENCH?

No matter what nitrogen rate you apply, you always use the same labeled rate for eNtrench. eNtrench treats the soil not the nitrogen. In the soil, eNtrench inhibits the Nitrosomonas bacteria that converts ammonia into the easily lost nitrate form.

eNtrench: 1.1 L/ac (2.7 L/ha)

14. WHAT IS THE ROI OF USING A NITROGEN STABILIZER?

ROI always depends on the crop being grown, final crop quality and current markets.

As one example, side-by-side trails conducted by Corteva Agriscience show an 7% yield increase in corn versus untreated.

eNtrench is priced at $9.30 per acre. The price is not tied to the rate of nitrogen used by the grower, rather it's a flat per acre cost which was more than paid back in that 7% yield increase.

Expectations are that single-year gains such as this will increase over time. The real value in this product will be seen over the long term.

15. WHAT IS THE BENEFIT OF A NITROGEN STABILIZER IN CORN?

Corn requires a significant nitrogen investment. eNtrench protects that investment by keeping more nitrogen in the root zone during critical peak uptake periods.

16. WHAT IS THE PRICE OF ENTRENCH?

eNtrench is priced at $9.30 per acre.

17. WHERE AND WHEN CAN THIS PRODUCT BE PURCHASED?

eNtrench is available for purchase at a number of fertilizer retails across Canada. Talk to your retailer about purchasing eNtrench, or contact your Corteva Agriscience representative.

18. WHAT IS THE ENVIRONMENTAL IMPACT OF A NITROGEN STABILIZER?

Research throughout North America has shown that a nitrogen stabilizer can reduce greenhouse gas emissions (nitrous oxides) on average by 51%.*

We have also proven through research done in the US that a nitrogen stabilizer reduces nitrate leaching on average by 16%.* This can be a significant benefit to farmers who require strict nitrate management to protect water resources.

Frequently asked questions

19. WHAT IS THE SIGNIFICANCE OF FALL FERTILIZER APPLICATION?

In the past 15 years, fall nitrogen prices have been on average 18% lower than spring. By using eNtrench, growers can take advantage of these lower prices plus get a head start on spring's work – allowing them to seed with confidence that the nitrogen is in the root zone when the plant needs it for optimized yield potential.

Additionally growers who apply nitrogen with eNtrench don't require additional fertilizer storage to take advantage of fall prices and supply – both enable on-farm in-field fertilizer storage.

20. HOW DO I APPLY ENTRENCH WITH MY UAN?

Add eNtrench to your tank as per product label guidelines. eNtrench mixes quickly and uniformly, and is very easy to use. For larger acres, eNtrench is available in totes.

21. HOW IS ENTRENCH PACKAGED?

eNtrench is available in 20 L cases (2x10 L jugs) that treat 18 acres and in 990 L totes that treat 900 acres.

22. SHOULD I ADJUST MY NITROGEN RATE WHEN USING ENTRENCH?

You should always use the recommended nitrogen rate based on your crop's fertility needs. eNtrench protects your nitrogen investment by keeping it in the root zone longer. It is a tool that allows you to precisely apply the recommended rate with the confidence it will still be there when the plant needs it.

23. CAN ENTRENCH BE IMPREGNATED ONTO UREA?

eNtrench can be impregnated onto urea but more research is being done with air drill applications to ensure success before we recommend this practice to growers. UAN applications are well understood and will be the focus for Corteva Agriscience.

24. WHERE CAN I SOURCE THE REQUIRED EQUIPMENT?

Contact your Corteva Agriscience representative or call the Solutions Center at 1-800-667-3852 to speak to one of our agronomists.

** Wolt, J.D. 2004. A meta-analysis of nitrapyrin agronomic and environmental effectiveness with emphasis on corn production in the midwestern USA. Nutrient Cycling in AgroEcosystems. Vol. 69. Issue 1, pp 23-41.*
***Based on Corteva Agriscience Canada research trials.*

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Visit us at nitrogenstabilizers.corteva.ca