

eNtrench NXTGEN™

Optinyte™ technology

NITROGEN STABILIZER

N-Serve™

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 N-Serve™ or eNtrench NXTGEN™ can reduce leaching (washing away) by 16%* and denitrification (gassing off) by 51%* on average.

When nitrogen is stabilized with N-Serve or eNtrench NXTGEN, 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 canola yields 8%** higher, wheat yields 6%** higher and corn yields 7%* higher, on average.

2. WHAT HAPPENS TO APPLIED NITROGEN?

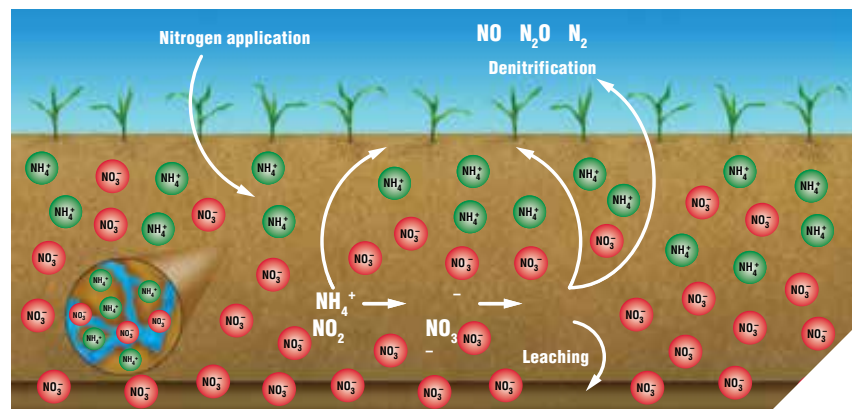
After application, nitrogen sources in the ammonium form (NH_4^+) convert to the nitrate form (NO_3^-) via a process called nitrification.

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.



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?

N-Serve and eNtrench NXTGEN are both nitrification inhibitors. N-Serve is designed for anhydrous ammonia applications and eNtrench NXTGEN 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. Nitrogen diffuses through the coating over a period time the rate of which is controlled by soil temperature. ESN® is an example of slow release.

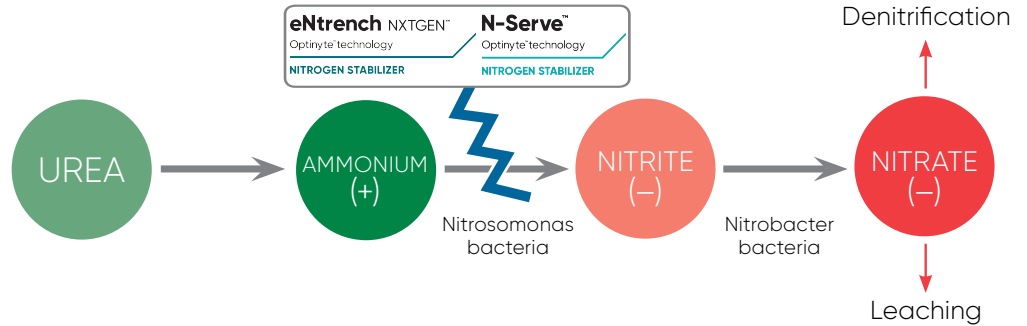
UREASE INHIBITORS inhibit the urease enzyme which catalyzes the hydrolysis of urea left on the soil surface. Any small amount of soil moisture causes unprotected urea to hydrolyze and convert to ammonium and carbon dioxide which may then be lost through volatilization. Urease inhibitors only provide 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. N-Serve and eNtrench NXTGEN are examples of nitrification inhibitors.

Frequently asked questions

7. N-SERVE AND ENTRENCH NXTGEN BOTH BEING NITRIFICATION INHIBITORS, HOW DO THEY SPECIFICALLY WORK?

Nitrapyrin is the active ingredient in N-Serve and eNtrench NXTGEN. It inhibits the activity of the Nitrosomonas bacteria for up to 10 weeks. By allowing the nitrogen to stay in the ammonium form (positively charged) longer, these products decrease nitrogen loss from leaching and denitrification and instead store it in the root zone for optimal plant use.



8. DO N-SERVE AND ENTRENCH NXTGEN TIE UP MY NITROGEN?

N-Serve and eNtrench NXTGEN do not “tie up” nitrogen. They protect 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. They inhibit 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 N-SERVE AND ENTRENCH NXTGEN NITROGEN STABILIZERS?

N-Serve and eNtrench NXTGEN Nitrogen Stabilizers:

Protect your investment

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

Optimize opportunity for yield and profit

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

Manage time and efficiency

- Fall application saves time in spring for seeding.

Expand your application options

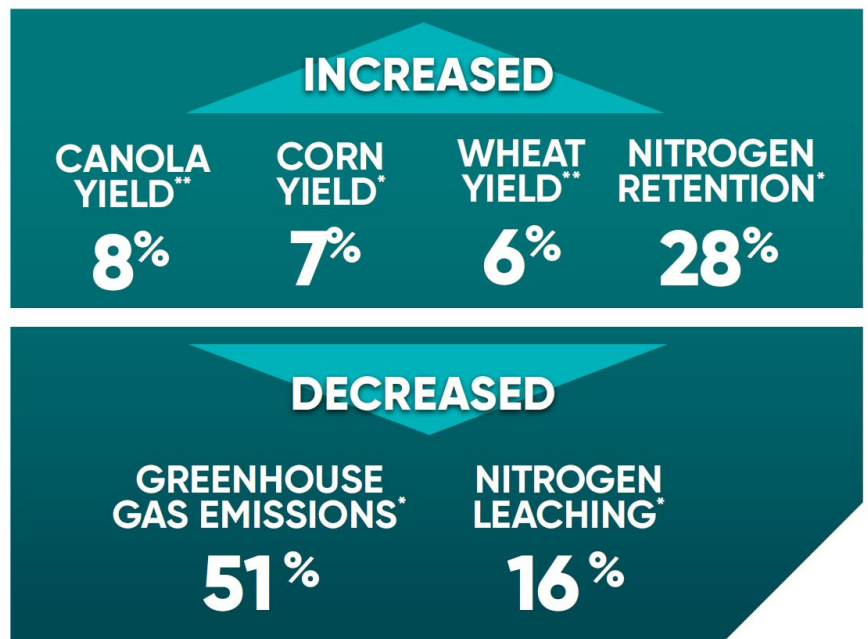
- Apply earlier in the fall (up to 2 weeks before typical anhydrous application).
- Take advantage of lower fall fertilizer prices and gain on-farm in-field storage.

Reduce environmental impacts

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

11. IS THERE DATA TO DEMONSTRATE THAT N-SERVE AND ENTRENCH NXTGEN PROTECT NITROGEN AND KEEP IT IN THE ROOT ZONE LONGER?

Canadian data has proven that there is a consistent yield increase over time by using N-Serve or eNtrench NXTGEN. These yield gains are due to both N-Serve and eNtrench NXTGEN decreasing denitrification by 51% and leaching by 16% which leads to an average of 21% more nitrogen retained in the root zone through out the growing season.



*Wolt, J.D. 2004. A meta-analysis of nitropryrin 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 N-SERVE AND ENTRENCH NXTGEN ON?

N-Serve and eNtrench NXTGEN are approved for use in canola, corn and wheat.

13. WHAT ARE THE RATES FOR N-SERVE AND ENTRENCH NXTGEN?

No matter what nitrogen rate you apply, you always use the same labeled rate for N-Serve and eNtrench NXTGEN. Both N-Serve and eNtrench NXTGEN treat the soil not the nitrogen. In the soil, N-Serve and eNtrench NXTGEN inhibit the Nitrosomonas bacteria that converts ammonia into the easily lost nitrate form.

N-Serve: 0.95 L/ac (2.35 L/ha)

eNtrench NXTGEN: 0.71 L/ac (1.75 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 8% yield increase in canola versus untreated.

N-Serve is priced at \$9.55 per acre and eNtrench NXTGEN 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 8% yield increase.

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

15. WHAT IS THE BENEFIT OF NITROGEN STABILIZERS IN CANOLA?

Canola requires a significant nitrogen investment. N-Serve and eNtrench NXTGEN protect that investment by keeping more nitrogen in the root zone during critical peak uptake periods.

16. WHAT IS THE PRICE OF N-SERVE AND ENTRENCH NXTGEN?

N-Serve is priced at \$9.55 per acre and eNtrench NXTGEN is priced at \$9.30 per acre.

17. WHERE AND WHEN CAN THESE PRODUCTS BE PURCHASED?

N-Serve and eNtrench NXTGEN are available for purchase at a number of fertilizer retailers across Western Canada. Talk to your retailer about purchasing N-Serve or eNtrench NXTGEN, or contact your Corteva Agriscience representative.

Frequently asked questions

18. WHAT IS THE ENVIRONMENTAL IMPACT OF NITROGEN STABILIZERS?

Research throughout North America has shown that nitrogen stabilizers can reduce greenhouse gas emissions (nitrous oxides) on average by 51%.* In Alberta there is a carbon credit system in place and other provinces like Saskatchewan are looking at a similar program. We are researching the ability of nitrogen stabilizers to contribute to these programs committed to reducing greenhouse gases.

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

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 N-Serve or eNtrench NXTGEN, 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 either N-Serve or eNtrench NXTGEN don't require additional fertilizer storage to take advantage of fall prices and supply – both enable on-farm in-field fertilizer storage.

20. HOW MUCH EARLIER IN THE FALL CAN I APPLY ANHYDROUS WHEN I USE N-SERVE?

N-Serve will give you a wider window of application in the fall by enabling you to apply two weeks earlier than usual. Research is ongoing to see if this window can be further expanded.

21. HOW DO I APPLY N-SERVE WITH ANHYDROUS AMMONIA?

A specialized pump delivers N-Serve safely and reliably into the nurse tank. Corteva Agriscience sources these pumps from a US provider.

Another option is a direct injection system, which meters out the product as the ammonia is being applied and injects it right into the ammonia delivery line (after the heat exchanger but before the splitter manifold).

22. HOW DO I APPLY ENTRENCH NXTGEN WITH MY UAN?

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

Frequently asked questions

23. HOW ARE N-SERVE AND ENTRENCH NXTGEN PACKAGED?

N-Serve is available in 950 L totes that treat 1,000 acres.

eNtrench NXTGEN is available in cases (2X9.94 L) that treat 128 acres and in 454.4 L totes that treat 640 acres.

24. SHOULD I ADJUST MY NITROGEN RATE WHEN USING N-SERVE AND ENTRENCH NXTGEN?

You should always use the recommended nitrogen rate based on your crop's fertility needs. N-Serve and eNtrench NXTGEN protect 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.

25. 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 nitrpyrin 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.*