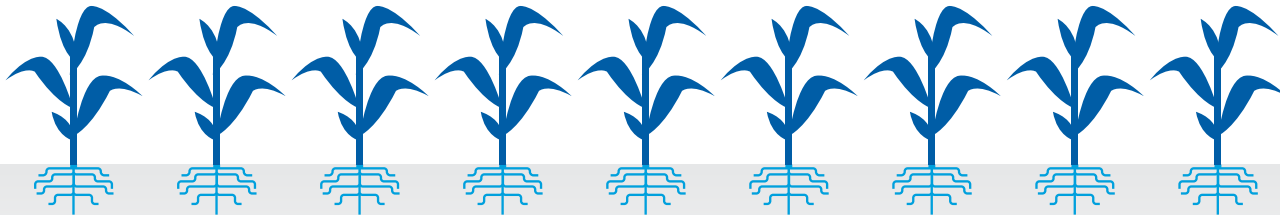


HOW IT WORKS

TRIBUNE®



TRIBUNE® nitrogen stabilizer from Koch Agronomic Services (Koch), contains both a urease and nitrification inhibitor to guard against volatilization, denitrification and leaching. Dual active ingredients NBPT — the most research-proven urease inhibitor technology — and Pronitridine — the patented active ingredient for nitrification inhibitor technology — come together to protect your UAN in a nonvolatile, true-liquid formulation.

HOW IT WORKS ABOVE THE GROUND

To better understand how TRIBUNE works, first you'll need to understand a bit about ammonia volatilization. Ammonia volatilization is the result of urease enzymes breaking down urea molecules into ammonia gas — a process called hydrolysis. In this form, nitrogen can be easily lost to the atmosphere. This is where NBPT comes in — the most research-proven urease inhibitor on the market. NBPT works to protect your crop from above ground nitrogen loss due to volatilization.

HOW IT WORKS BELOW THE GROUND

UAN contains nitrogen in the ammonium form as well as urea. In the ammonium form, nitrogen is available for uptake by the crop. Ammonium will convert to nitrate, the rate of which is dependent on the soil type and soil temperature. In the nitrate form, the nitrogen is susceptible to loss via leaching and/or denitrification. TRIBUNE's second active ingredient Pronitridine slows conversion from ammonium to nitrate and safeguards nutrients from below-ground loss. Slowing the conversion of ammonium to nitrate is key to preventing nitrogen loss.



The conversion of ammonium into nitrate is a three-step process — the most important step performed by AMO, which is found inside the nitrosomonas bacteria.

AMO

ACTIVE SITE

AMO has an active site where oxidation occurs. When ammonia is oxidized by AMO, it begins the nitrification process.

AMO

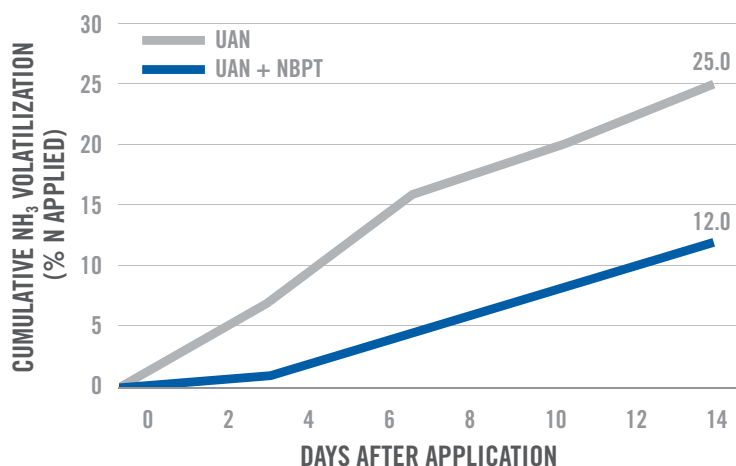


3x
LONGER
PROTECTION

Research suggests the second active ingredient in TRIBUNE — Pronitridine — exhibits nitrification inhibition by temporarily occupying the active site or altering the enzyme so that it cannot oxidize ammonia. This means TRIBUNE can hold the nitrogen in the ammonium form three times longer than without an inhibitor.¹

CONTINUED ▶

REDUCED AMMONIA VOLATILIZATION FROM UAN TREATED WITH NBPT



Once applied, NBPT quickly blocks the hydrolysis of urea. In a 2011 study, approximately 25 percent of the urea-nitrogen in untreated UAN was lost to ammonia volatilization 14 days after application. However, when UAN was treated with NBPT, nitrogen loss to ammonia volatilization decreased to approximately 12 percent.²

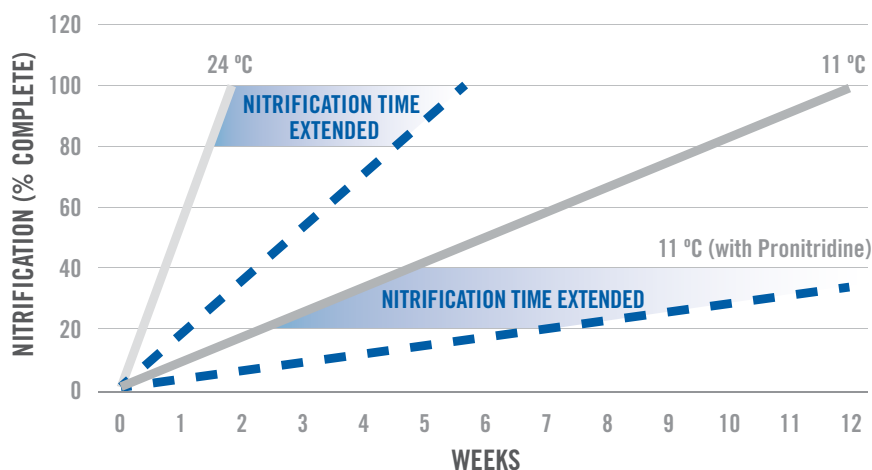
Greenhouse study. Nitrogen rate of 89 lbs. N/acre
Source: Adapted from Goos, 2011. North Dakota State University.

EXTENDED PROTECTION

Nitrification occurs when applied nitrogen is converted from ammonium to nitrate. In the nitrate form, your investment is susceptible to leaching and can move beyond the plant's root zone. **As a nitrification inhibitor, Pronitridine slows the conversion of ammonium to nitrate and can hold the nitrogen in the ammonium form three times longer than without an inhibitor.¹**

As shown in the model, at soil temperatures 11 °C, 100 percent of nitrogen applied without an inhibitor would be nitrified in 12 weeks. However, with Pronitridine, more than 60 percent of the applied nitrogen would remain in the ammonium form after 12 weeks.

MODEL OF PRONITRIDINE'S IMPACT ON NITRIFICATION RATES AT VARIOUS TEMPERATURES (APPROXIMATED)



Graph is derived from the Nutrient Management for Agronomic Crops in Nebraska (Tim Shaver, p.7) and third-party laboratory studies funded by Koch Agronomic Services.



Using TRIBUNE follows the recommendation of the 4R Nutrient Stewardship Initiative (Right Source @ Right Rate, Right Time, Right Place[®]) and minimizes environmental concerns related to agriculture, while maximizing economic benefits — benefiting your community and your bottom line.

THE CHOSEN SOLUTION FOR UAN PROTECTION

Defend against all three forms of nitrogen loss in one convenient formulation.

For more information about TRIBUNE nitrogen stabilizer, talk to your KAS representative.



¹The underlying data is based on third-party laboratory studies funded by Koch Agronomic Services; results may vary based on a number of factors, including environmental conditions. ²The underlying data was provided by North Dakota State University under a Research Trial Financial Support Agreement with Koch Agronomic Services, LLC, and neither North Dakota State University, nor the individual researchers referenced, endorse or recommend any product or service. The 4R approach is endorsed and supported by the International Plant Nutrition Institute, The Fertilizer Institute, the Canadian Fertilizer Institute and the International Fertilizer Industry Association. TRIBUNE[®] and the TRIBUNE logo are trademarks of Koch Agronomic Services, LLC. Koch and the Koch logo are trademarks of Koch Industries, Inc. © 2019 Koch Agronomic Services, LLC.