

Department of Biosystems Engineering and Soil Science

PERFORMANCE OF ENHANCED EFFICIENCY NITROGEN FERTILIZER (EENF) ON AMMONIA VOLATILIZATION

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Key Takeaway: Urea was more susceptible to ammonia volatilization than urea ammonium nitrate (UAN). Surface-broadcast UAN was more susceptible to ammonia volatilization than UAN dribbled in between rows. The enhanced efficiency N fertilizers (EENF) reduced ammonia volatilization loss compared with the untreated forms.

Introduction

- Ammonium-based fertilizers, the most commonly used N fertilizers in Tennessee, are relatively susceptible to volatilization losses compared to other N sources.
- Currently, a N management tool to minimize N loss is enhanced efficiency nitrogen fertilizers. This includes the use of stabilizers and/or granule coatings that delay N release.
- There is limited information on the percentage of ammonia loss from urea-based fertilizers applied onto soils in Tennessee and the efficacy of some newer EENF products.

Objective

- Quantify the inhibitory effect of EENF on ammonia volatilization in dryland corn.

Trial

- **Years:** 2020-2022.
- **Experimental Design:** RCB/4 replications.
- **Location:** Milan, Tennessee.
- **Production System:** no-till dryland.

- **N Treatments:** Urea, Urea+ANVOL, SuperU, ESN, Ammonium nitrate, Dribbled UAN, Dribbled UAN+ANVOL, Surface UAN, and Surface UAN+ANVOL.
- **N rate/timing:** 120 lbs. N/A, V4-V6.
- **Crop/varieties:** Corn/Dekalb 65-95.
- **Crop management:** University of Tennessee recommendations for dryland corn.

Results

- Urea without N stabilizer volatilized the most ammonia (23.1-25.5 percent) each year. In one of three years, surface broadcast UAN without stabilizer produced similar volatilization.
- In 2021 and 2022, surface broadcast UAN was more susceptible to ammonia volatilization (16.9-23.9 percent) than UAN dribbled in between rows (12.5-15.6 percent).
- Untreated urea and UAN volatilized significantly higher amounts of total ammonia than its corresponding EENF forms (Figure 1).

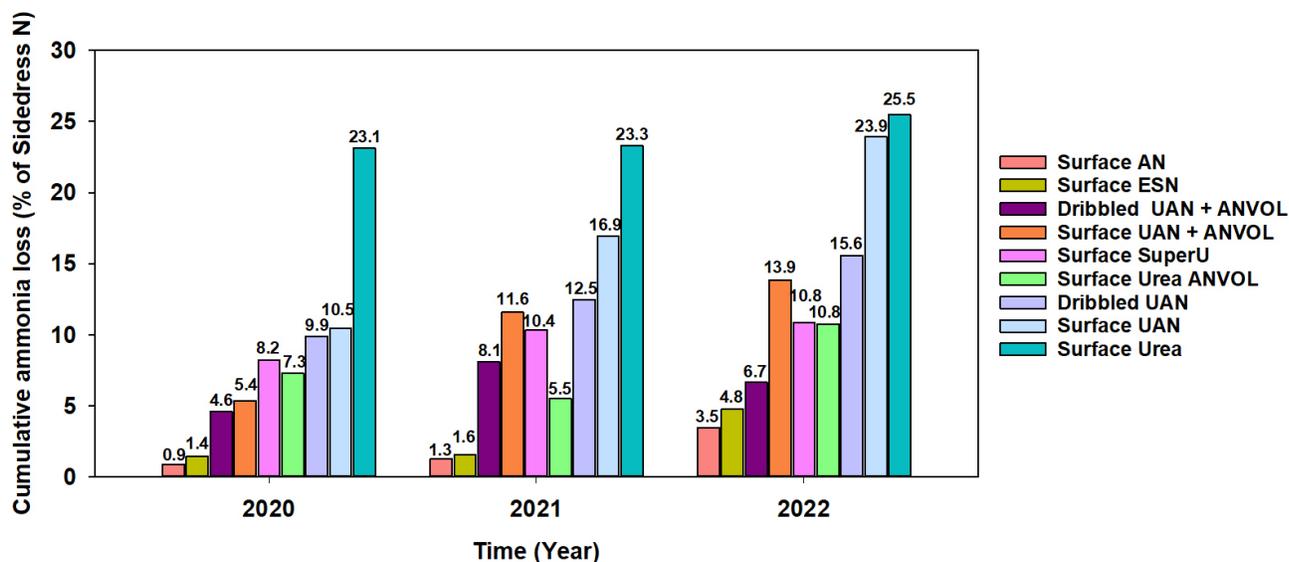


Figure 1. Cumulative ammonia loss from N fertilizer treatments over an 18-day period in 2020 and a 21-day period in 2021 and 2022. The EENF include: ANVOL, SuperU, and ESN. ANVOL is a nitrogen stabilizer containing NBPT and Duromide as the active ingredient; SuperU is urea stabilized with dicyandiamide (DCD) and N-(n-butyl) thiophosphoric triamide (NBPT); ESN is polymer coated urea fertilizer.



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