

Introduction

Urease inhibitors are often used with urea fertilizers when surface applied to prevent volatilization. With minimal rainfall, it is suspected that a light tillage incorporation of urea may actually have greater volatilization losses than a deeper incorporation or even a surface application due to soil moisture. This study measured the loss of nitrogen by volatilization with the use of ammonia traps and corn yield, as affected by urea with and without a urease inhibitor and under various tillage incorporations.

Materials and Methods

- Urea applications: urea, and urea with urease inhibitor (NBPT-NPPT, Limus®), applied at 130 lbs N ac⁻¹.
- Tillage applications: surface application, shallow tillage incorporation (2" deep), and deep tillage incorporation (4" deep). A small rotary tiller was used.
- The ammonia traps: a PVC collar with a suspended polyethylene foam pad soaked in an 11.45% phosphoric acid and 4.55% glycerol solution. Sampled at 5, 10, 20, and 30 days after treatment.
- Yield was collected with a two row small plot combine.



Figure 1. Ammonia traps.



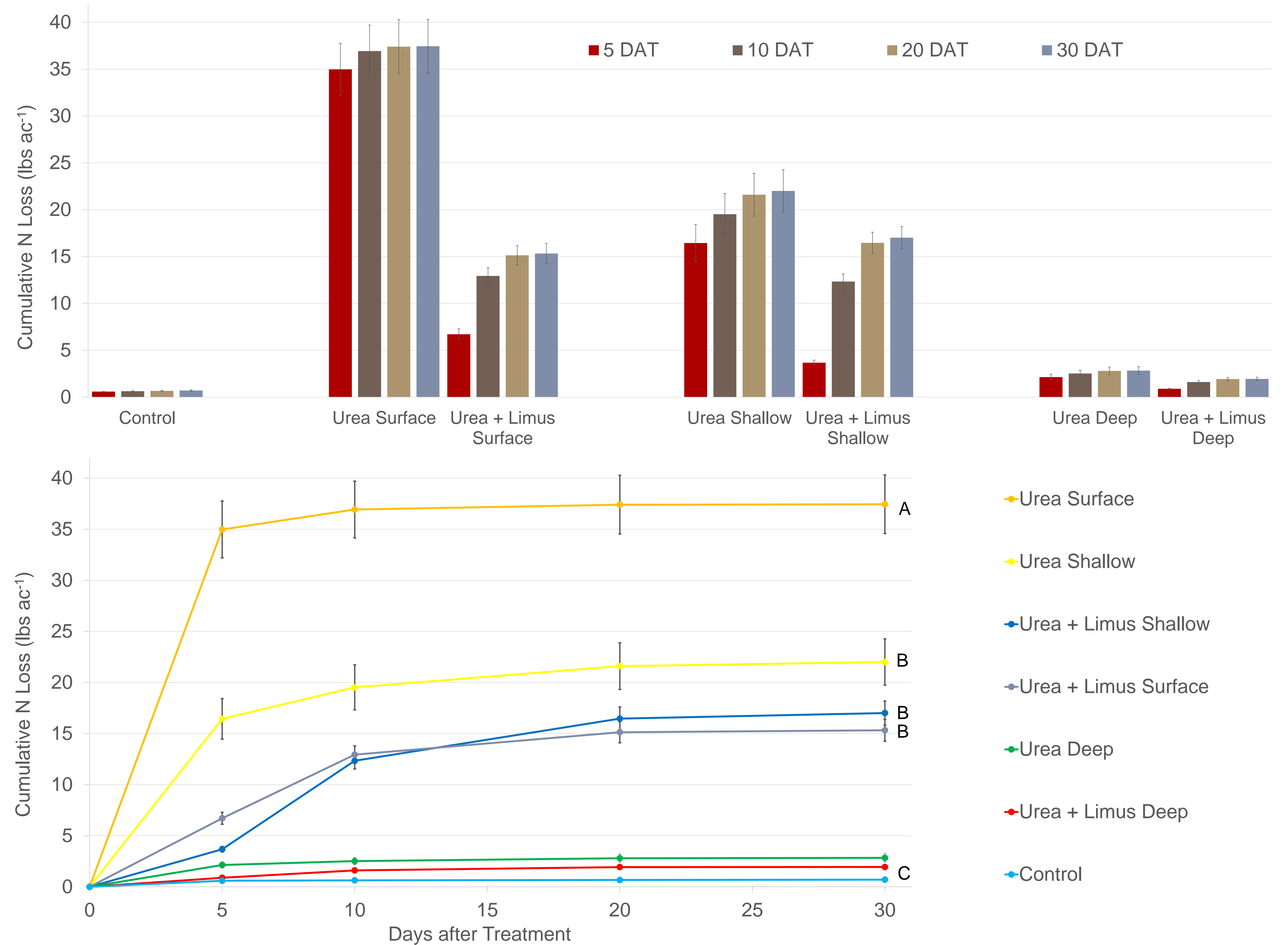
Figure 2. Rotary tiller (left) and plot combine (right).

Acknowledgements

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Results



Figures 3 and 4. Cumulative nitrogen loss (lbs acre⁻¹). Different letters indicate significant differences at 30 DAT ($P < 0.0001$).

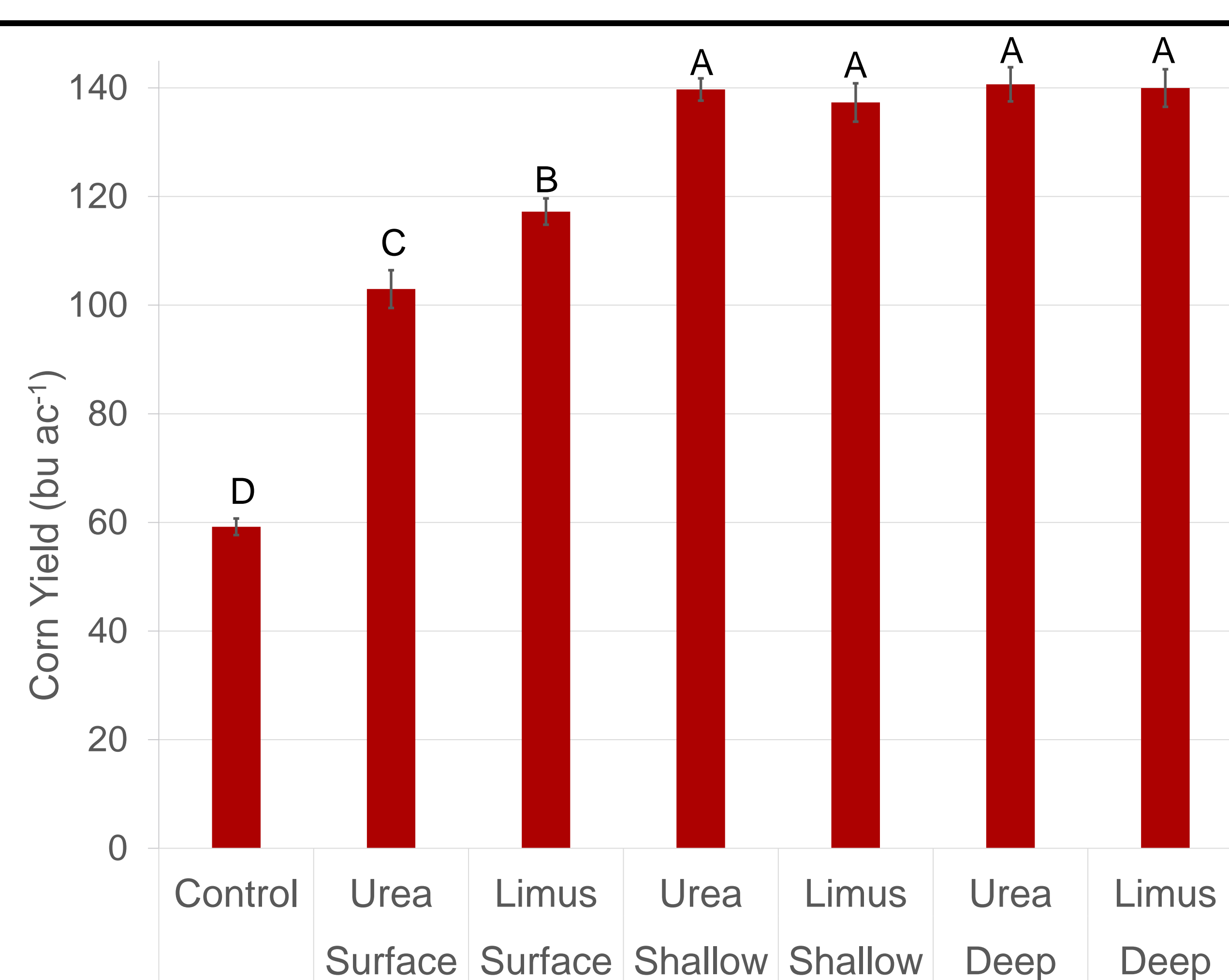


Figure 3. Corn yield (bu ac⁻¹).

Different letters indicated significant differences ($P < 0.0001$). Error bars represent standard error of the mean.

Conclusions and Implications

- 5 days after treatment, all urea only treatments had significantly greater ($P < 0.01$) N loss than urea + Limus treatments. The urea surface application lost 27% of the 130 lbs ac⁻¹ applied N, compared to the 5% the urea + Limus surface application. The shallow application lost 13% with urea vs 3% with urea + Limus after 5 days. The difference in the deep applications were negligible.
- Even with shallow incorporations, urea with Limus can help lower the loss of nitrogen due to volatilization compared to urea.
- Yields were similar and highest within the shallow and deep applications, followed by the urea + Limus surface application, then the urea surface application, and finally lowest in the control.
- This research will help inform farmers and potentially provide a cost savings by determining when to use an urease inhibitor and how to incorporate the urea to help minimize nitrogen loss due to volatilization and to prevent yield loss.