

Utilizing Inhibitor Technology to Reduce Ammonia Volatilization Losses from Urea Sources Applied in Conservation Tillage

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ABSTRACT

A severe limitation to urea fertilizers and the urea component in livestock wastes is the high potential for volatile loss of nitrogen (N) as ammonia. Losses are especially severe when the urea-containing materials are surface applied with no or only limited subsequent incorporation. Extensive losses are also observed when urea is applied to warm soils that are moist and undergoing rapid drying. Soil pH, the presence of an active microbial population, and soil texture are also known to impact volatilization losses. Urease inhibitor technology commercially available offers producers management options that can greatly reduce ammonia losses from urea use and significantly improve the crop N use efficiency of the applied fertilizer.

A four-year experiment was conducted at two southern Illinois locations (Belleville and Dixon Springs) to evaluate the urease inhibitor *N-(n-butyl) thiophosphoric triamide* (NBPT) when added to granular urea and urea-ammonium nitrate (UAN) solution. The efficacy of NBPT addition with the urea sources was evaluated against granular ammonium nitrate and injected UAN solutions when applied to corn under no tillage practices. Ammonia volatilization losses as manifested through corn N use efficiency data and grain yield showed that ammonia losses varied from less than 10 percent to over 50 percent across the 8 site years of this experiment. Compared to ammonium nitrate at 100 percent, relative corn N use efficiency for granular urea was 74 percent and urea plus NBPT was 91 percent at Belleville. A similar comparison of N use efficiency at Dixon Springs was 100, 85, and 96 percent, respectively, for ammonium nitrate, urea, and urea plus NBPT. For surface-applied UAN solutions, the benefits obtained with NBPT use were only about one-half those achieved when applied with granular urea. An economic evaluation showed that NBPT was very cost effective when added to urea but was of only limited economic value when added to UAN solutions.

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