

OPTIMIZING NITROGEN APPLICATION IN CORN WITH AND WITHOUT A NITRIFICATION INHIBITOR

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ABSTRACT

Determining an accurate nitrogen (N) recommendation for corn production presents significant challenges due to its complexity with N transformation and losses. A careful diagnosis and decision making is required for optimizing the N management in corn. Therefore, a three-year (2023-2025) field study was conducted to evaluate the effects of varying nitrogen (N) application rates and timings with the use of a nitrification inhibitor (NI) on corn grain yield and productivity. The study was arranged in a randomized complete block design with three N application timings (fall, spring, V6 growth stage) and five N rates (0 (NTC), 60, 120, 180, and 240 lb N ac⁻¹) applied with or without pronitridine, a NI. Anhydrous ammonia (AA) was the fertilizer source for fall and spring application, whereas urea ammonium nitrate (UAN) was used for the V6 application. Results highlighted that fertilizer performance can vary substantially between years, with 2025 and 2024 generally showing higher grain yields and more favorable production metrics compared to 2023. In 2023, the highest yield was observed with 240 lb N ac⁻¹ applied at V6 with NI, compared to fall AA at the rate of 240 lb N ac⁻¹. In contrast, in 2024 and 2025, 240 lb N ac⁻¹ applied in spring produced the highest yield, but no differences were observed with addition of NI with this rate. Each year, the lowest N rates such as 60 and 120 lb N ac⁻¹ with or without NI had the lowest yields. The findings suggested the importance of carefully selecting fertilizer sources, rates, and application strategies to optimize corn production, recognizing that optimal approaches may vary depending on specific annual environmental conditions.