Historically, nitrogen (N) corn fertilizer rate recommendations have been determined on a yield-based approach. However, the poor relationship between the yield-based rate recommendation and the maximum return to N (MRTN) rate has led to the establishment of a Corn Nitrogen Rate Calculator that can be utilized on a regional basis across the Corn Belt. The Corn Nitrogen Rate Calculator is a tool to determine the most profitable fertilizer N rate for corn by calculating the return to N application and finding the MRTN at selected prices of N and corn in individual states.\(^1\)\(^2\)

**Study Guidelines**

A replicated trial was conducted in 2011 at the Monsanto Learning Center in Monmouth, IL to evaluate the Corn Nitrogen Rate Calculator as a decision tool for determining corn N fertilizer rates. Corn was planted on May 5, 2011 with different corn rootworm (CRW) protection as follows: 1) 105 day relative maturity (RM) products of Genuity® SmartStax® and Roundup Ready® Corn 2 plus soil applied insecticide (Force® 3G); 2) 111 RM products of Genuity SmartStax and Roundup Ready Corn 2 plus soil applied insecticide; and 3) 113 RM products of YieldGard VT Triple® and Genuity® VT Double PRO™ plus soil applied insecticide. The N treatments evaluated in the trial were as follows:

1. 0 lb N/acre
2. 90 lb N/acre
3. 180 lb N/acre
4. 270 lb N/acre

The N source was 32% urea ammonium nitrate (UAN) solution, and all N treatments were applied preplant and incorporated into the soil. Planting was in a continuous corn system using conventional tillage (chisel plow in the fall, soil finisher in the spring). Weed control consisted of a preemergence treatment of Harness® Xtra 5.6L at 2 quarts per acre followed by a postemergence treatment of Roundup WeatherMAX® at 22 ounces per acre. Corn was harvested on September 21, 2011.

**Results and Discussion**

Overall, CRW protection technologies had no effect on yield within N treatments, suggesting low rootworm pressure at this site (Figure 1). Therefore, the nitrogen response curve (NRC) was calculated by averaging all corn product yields within the N rate (Figure 2). The NRC was used to calculate the N rate that maximizes yield. A maximum yield of 220 bu/acre was obtained with a N rate of 239 lb N/acre. The MRTN rate of 195 lb N/acre was obtained by using the

\[
y = -0.0021x^2 + 1.0016x + 100.31 \\
R^2 = 0.9759
\]
Evaluation of a Nitrogen Rate Calculator

Corn Nitrogen Rate Calculator Web tool, choosing central Illinois, corn following corn, and setting a corn price of $6.15 per bushel with the set price for 32% UAN fertilizer (Figure 3).\(^2\) Guidelines provided for a profitable N rate was in the range of 182 to 207 lb N/acre. The MRTN rate of 195 lb N/acre resulted in a calculated yield of 216 bu/acre, and a yield range of 213 to 218 bu/acre was for the profitable N rate range. The applicability of the Nitrogen Rate Calculator for this area was evaluated by comparing the N rate obtained from the NRC with the MRTN rate guidelines (Figure 4). When considering projected yield, corn price and fertilizer cost, a more profitable net return would be possible by choosing a N rate within the guidelines of the Corn Nitrogen Rate Calculator.

This testing showed that the Corn Nitrogen Rate Calculator can be effectively used to determine corn N recommendations for this area under the described conditions.

REFERENCES


The information discussed in this report is from a single site, non-replicated, one-year demonstration. This information piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

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### Figure 3. Maximum return to nitrogen (MRTN) rate developed by using the Corn Nitrogen Rate Calculator Web tool.\(^2\)

\[
MRTN @ 195 N/acre = 216 bu/ac
\]

\[
\text{NRC yield} @ 239 lb N/acre = 220 bu/ac
\]

\[
y = -0.0021x^2 + 1.0016x + 100.31
\]

\[R^2 = 0.9759\]

### Figure 4. Yield comparison at N rates developed by the NRC and the MRTN methods.