

LEARNING CENTER 2011

at Monmouth, Illinois

DEMONSTRATION REPORT



EVALUATION OF A NITROGEN RATE CALCULATOR

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

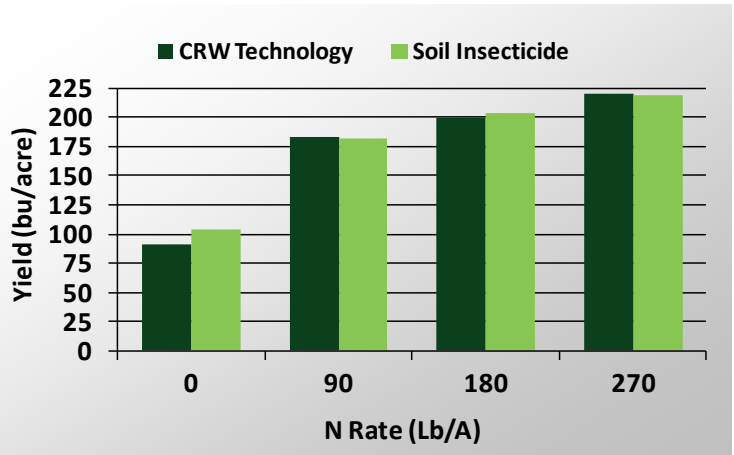


Figure 1. Average corn yield across corn rootworm (CRW) protection technologies and products at different nitrogen (N) rates.

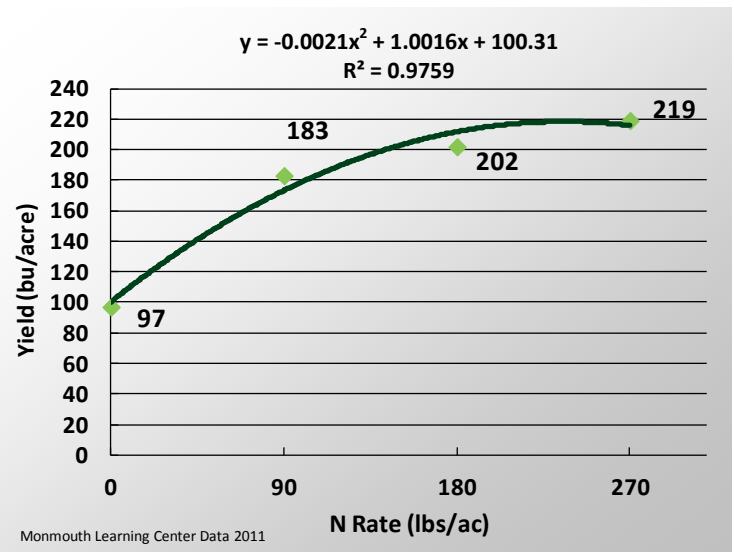


Figure 2. Nitrogen response curve (NRC) using average yields across all corn products.

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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

¹Sawyer, J. et al. 2006. *Concepts and rationale for regional nitrogen rate guidelines for corn.* Iowa State University extension publication PM 2015, April 2006.

²Corn Nitrogen Rate Calculator. Iowa State University. <http://extension.agron.iastate.edu> (verified 11/4/2011).

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.

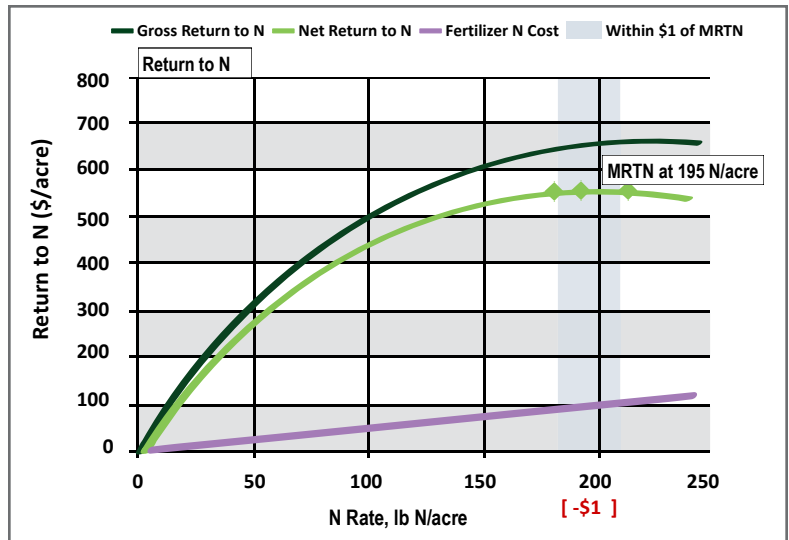


Figure 3. Maximum return to nitrogen (MRTN) rate developed by using the Corn Nitrogen Rate Calculator Web tool.²

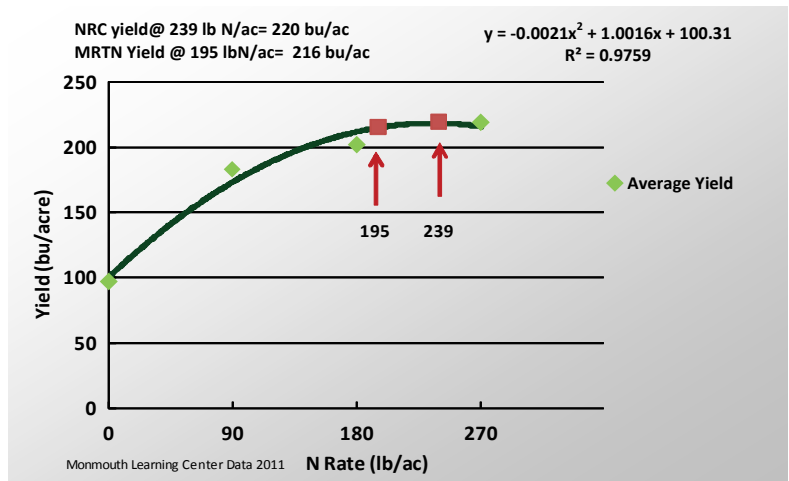


Figure 4. Yield comparison at N rates developed by the NRC and the MRTN methods.

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