No-Till Corn Response to Rotation and Nitrogen Levels

While no-till corn has numerous benefits, achieving optimum yields requires knowledge about the effects of rotation and soil fertility. Plant residue can create management issues, especially in continuous corn production. A research study was conducted at the Monmouth Learning Center to determine the yield response of corn in a no-till system with step-down N rates in both continuous corn and a corn-soybean rotation.

Demonstration Testing

A demonstration was conducted at the Monmouth Learning Center to assess corn response to nitrogen (N) in a no-till system with continuous corn production and corn production in a corn-soybean rotation.

A 111 relative maturity (RM) corn hybrid with Genuity® SmartStax® trait package was selected for the demonstration. The site location has been in no-till since the 1980s, and the crop rotation schedule utilized in the trial has been in place for the past five years. The field was divided into four blocks: two blocks with alternating corn-soybean rotation and two blocks in continuous corn and continuous soybean production.

All products were planted at a population of 36,000 seeds/acre on May 13, 2011 and harvested on October 4, 2011. Weeds were controlled with a preemergence herbicide application of Harness® Xtra at 2 qts/acre and a post-emergence application of Roundup PowerMAX® at 22 fl oz/acre with AMS at 17 lbs/100 gal.

Different amounts of N were applied to the demonstration plots. N was applied preplant using 32% UAN solution. The plots received an N rate based on the previous crop planted. For demonstrations in continuous corn production, the 100% N application was 220 lbs N/acre, and for demonstrations in the corn-soybean rotation, the 100% N application was 180 lbs N/acre. N rates were applied at 100%, 75%, 50% and 25% in both continuous corn and corn-soybean rotation scenarios.

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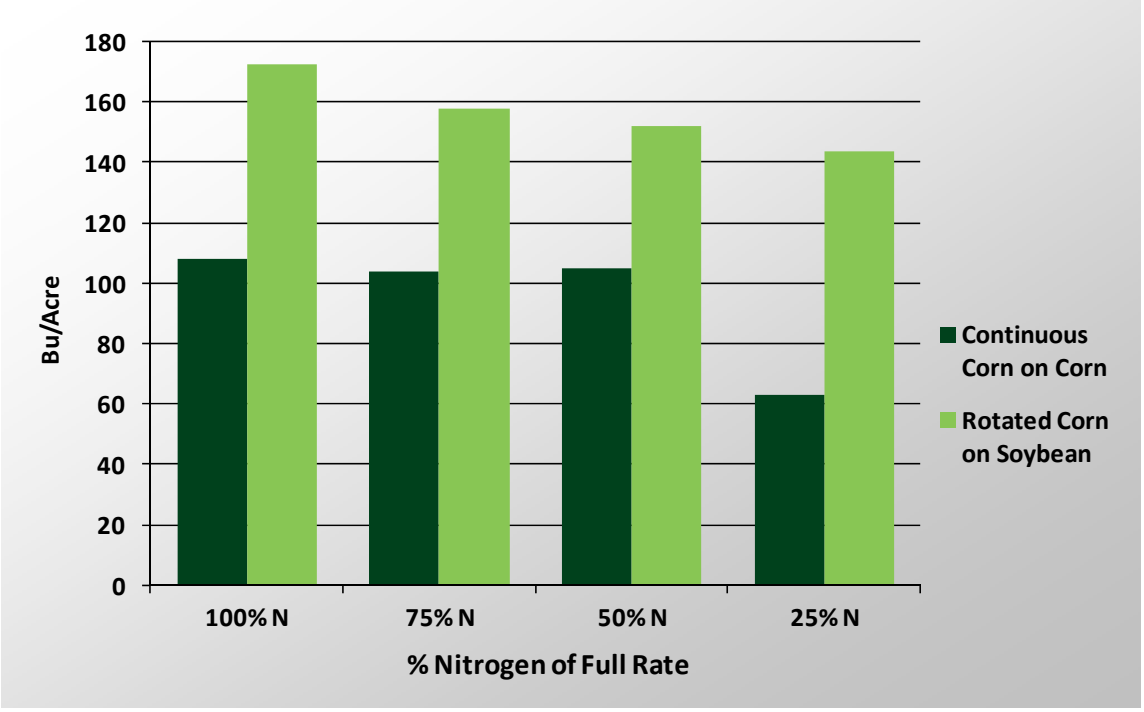

Figure 1. No-till corn response to nitrogen (N) rates for fields in continuous corn and corn-soybean rotation. 100% N rates: Continuous corn = 220 lbs N/acre; Rotated corn on soybean— 180 lbs N/acre.

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Summary Comments

Yield were highest (172 bu/acre) when the 100% N rate (180 lbs N/acre) was applied to corn in a corn-soybean rotation. Even when only 25% of the full N rate (45 lbs N/acre) was applied to the corn in a corn-soybean rotation, yield results were higher than all continuous corn yields reported.

This trial demonstrates the accumulated yield penalty in continuous corn systems. Rotated corn and soybean systems demonstrated moderate yield gains with increasing units of N.

Commodity pricing coupled with advancements in corn production may have many producers looking to change their crop rotation to continuous corn production. However, a corn-soybean rotation, especially in no-till systems, can be beneficial to corn yield potential. In a literature review of published data comparing continuous corn to a corn-soybean rotation, corn in a rotation reported higher yield results than corn in continuous corn systems in all but two of the studies[1]. One yield reducing factor to continuous corn may be residue management, which can be especially problematic in a no -till system. Microbial decomposition of previous season's residue utilized the bulk of N applied to the continuous corn system[2]. University research indicates a 25 bu/acre yield reduction with continuous corn and the yield reduction may increase over time[2]. Other factors that may contribute to a yield drag in continuous corn systems includes greater levels of disease inoculum, residue interference with planting, a longer period for soils to warm in the spring, and a decreased efficacy of soil-applied herbicides. Farmers must use a systems approach to residue management which involves the integration of planting, nutrient management and special harvesting.

Source:

[1]Erickson, B. 2008. Corn/soybean rotation literature summary. Purdue University. http://www.agecon.purdue.edu/ (verified 11/8/11).

[2]Below, F. Seven wonders of corn. Monmouth Learning Center. Growers Day. Monmouth, IL. 3 August 2011.

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