

Additional Resources

Corn Nitrogen Rate Calculator <http://extension.agron.iastate.edu/soilfertility/nrate.aspx>

"Don't Fertilizer Your Weeds" <http://ipcm.wisc.edu/WCMNews/tabid/53/EntryId/498/Don-t-Fertilize-Your-Weeds.aspx>

"Defeating Weeds in Corn" <http://ipcm.wisc.edu/WCMNews/tabid/53/EntryId/668/Defeating-Weeds-in-Corn.aspx>

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What's inside?

- 2009 Nitrogen Rate Studies: Preliminary results
- Increase Nitrogen Efficiency through Timely Weed Control!

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Focus on Ag

Dear Ag Producer,

In this edition, I've included preliminary results from the nitrogen management studies that we conducted in Dakota County this past season. Thanks to the late fall, we're behind in the full analysis, but the complete results will be available at the 4th Annual Crops Day.

In the second article, we look at weeds' greedy appetite for nitrogen in a study that has linked the importance of early weed control to N use efficiency.

We have several workshops scheduled this winter at the Extension and Conservation Center in Farmington that I hope you'll take advantage of:

Economics of Manure Workshop, Monday, February 8, 12:30 p.m.– 3:30 p.m., lunch included.

This is a workshop for agricultural producers interested in getting the most economic value from livestock manure. Participants should bring their own laptop, if possible. Preregistration is required (space is limited). No cost for attending.

Private Pesticide Applicator License Renewal Workshop, Friday, February 26, 9 a.m. – 12:30 p.m.

Private pesticide applicators whose licenses expire in 2010 can renew by attending this workshop. Bring photo I.D. and Private Pesticide Applicator Certification card number. Preregistration is not required, but there is a \$50 license renewal fee.

4th Annual Crops Day, Tuesday, March 2, 9 :00 a.m. – noon

A half-day program summarizing what we've learned from four years of fertilizer nitrogen rate and sensor technology research in irrigated corn in Dakota County and other timely crop nutrient and pest management issues. No pre-registration and no cost for attending.

Riparian Forest Buffer Workshop, March 24, afternoon or evening session, dinner included.

A workshop for stream-side landowners interested in improving water quality, trout and wildlife habitat or exploring income producing options from a stream buffer. Preregistration required. No cost for attending.

For more information, don't hesitate to contact me at 651-480-7757 or bonga028@umn.edu or visit www.dakotacounty.us and search "Winter 2010 ag programs."

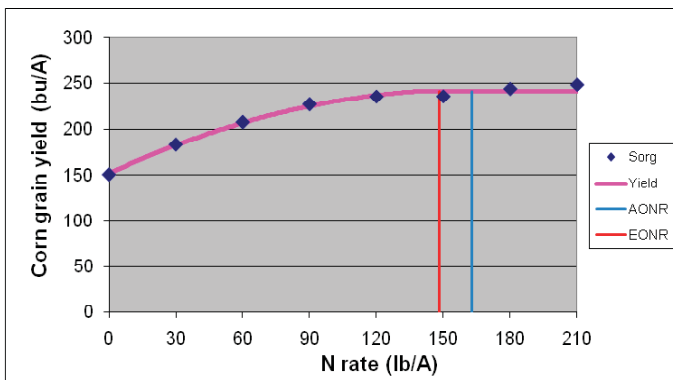
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Preliminary Results

Since University of Minnesota fertilizer nitrogen (N) rate recommendations for corn were changed in 2006, we have been able to conduct several on-farm field trials to test the new guidelines under local conditions. The new recommendations reflect a shift from maximizing yield to maximizing the return on nitrogen investment, while having little impact on groundwater. Our local research has expanded in the past couple of years to include the evaluation of two technologies that sense nitrogen status during the growing season, the SPAD chlorophyll meter and the Greenseeker™. These efforts would not have been possible without the help from several local producers and support from the Vermillion River Watershed Joint Powers Organization.

Due to the late fall, we can offer preliminary results for the 2009 season in this edition. Once again this year, we had two irrigated corn sites: one was located on a loam in Ravenna Township where the previous crop was soybeans; the second site was just south of Hastings on a loamy sand where the previous crop was corn.

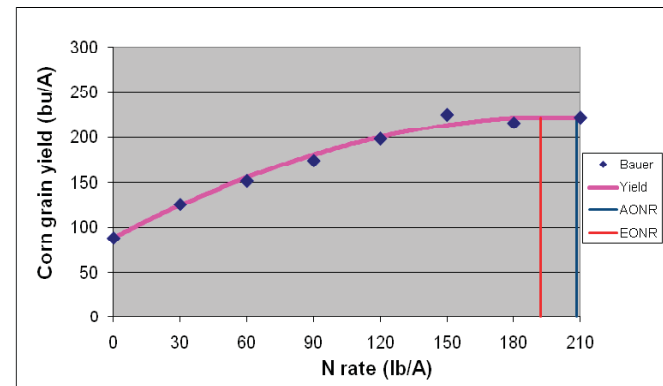
Figure 1. Corn grain yields at varying fertilizer nitrogen rates on an irrigated loam soil in Ravenna Township, 2009.



The studies continue to include an evaluation of nitrogen rates (0, 30, 60, 90, 120, 150, 180 and 210 pounds N per acre). Urea was split applied with the first application just after planting (5/5) and the second one month later when the corn was 6 to 12 inches tall (6/1). Corn yield response to nitrogen for both sites can be seen in Figures 1 and 2. At the Ravenna Township site, the maximum corn yield of 241 bushels per acre was achieved with 163 pounds N per acre (agronomic optimum N rate). Nitrogen applied above this rate did not result in any additional yield. The economic optimum N rate (EONR), which takes fertilizer costs and corn price into account, was 148 pounds of N per acre. In this study we used an EONR ratio of 0.10 (cost of N per pound/price of corn per bushel). The EONR is the rate that maximizes return to N, so any applications above this rate would not be cost effective.

At the Hastings site, the yield plateaued at 223 bushels per acre. The N rate that achieved maximum yield (AONR) was 208 pounds N per acre while the rate that maximized return to N

Figure 2. Corn grain yields at varying fertilizer nitrogen rates on an irrigated sandy loam soil near Hastings in Marshan Township, 2009.



was 193 pounds per acre (EONR). As part of the N rate evaluation, we took samples for basal stalk nitrate concentrations before harvest and are waiting for the results. This test has been used as a post-mortem tool to distinguish between fertilizer application rates that were adequate and those that were excessive. Iowa State University suggests that levels between 700 and 2000 ppm indicate that nitrogen

had been applied at an optimum rate. In our previous studies, the EONRs have consistently fallen in this optimum range.

We're also waiting for yield analysis of the sensor technology treatments. All of the results from the 2009 season and a complete summary of four years of field trials in Dakota County will be discussed at Crops Day, March 2.

Increase Nitrogen Efficiency through Timely Weed Control!

Everyone knows that weeds compete with crops for light, water and nutrients, but did you know that weeds have a particularly voracious appetite for nitrogen? A two-year study out of Wisconsin looked at how the timing of weed control affects the amount of nitrogen needed to produce an optimum corn crop. Weeds were controlled at three different times:

- 1) preemergence,
- 2) 4-inch height or
- 3) 12-inch height.

When weeds were controlled early with either a preemergence or early post application, corn yields of 200 bushels per acre were achieved with nitrogen rates between 100 and 120

pounds N per acre. However, when control was delayed until weeds were 12 inches in height, the amount of nitrogen needed to obtain the same yield increased to 200 pounds N per acre.

Weeds consume significant amounts of nitrogen that will no longer be available for the corn crop. In Table 1, you can see that even at a 4-inch height, nitrogen uptake was 12 and 26 pounds per acre over the two years. Nitrogen uptake doubled to 25 and 67 pounds per acre in the short time between 4- and 12-inch weeds. In these studies, that period was only 8 days! In this short period of time, corn yields were reduced an average of 12 and 18 bushels per acre.

Table 1. Nitrogen uptake by weeds and corn grain yields averaged over N rates at varying times of weed control¹.

Time of weed control	Nitrogen uptake by weeds		Corn grain yield	
	2006	2007	2006	2007
	pounds N per acre		bushels per acre	
Preemergence	-	-	209	224
4-inch weeds	12	26	206	217
12-inch weeds	25	67	194	199
Nontreated	74	123	-	-

¹Boerboom, C.M. and C. Labowski, University of Wisconsin-Madison.

What are the take-home messages? Whether you use a preemergence and/or early post application, it will be more profitable than untimely post applications, particularly with high N costs. When weed control is delayed, the amount of N needed to optimize yields increases dramati-

cally. Applying N to compensate for late weed control is expensive and increases risks to the environment. If post application timing is a concern, using a preemergence herbicide can be an excellent risk management tool.