



UNIVERSITY OF MINNESOTA
EXTENSION

Focus on Ag

November 2011

1

Vol. 5 No. 3



R.L. Croissant, Bugwood.org 5361287

Dear Ag Producer,

For the past several years, we've spent a lot of time talking about nitrogen management on sandy soils. This is an equal opportunity edition, as we'll shift the focus to loamy soils in Dakota County. You'll find a summary of the nitrogen rate studies we conducted in several locations on finer-textured soils, a short discussion of other best management practices, and resources that are available to help fine-tune N management in Dakota County.

This coming winter, we will again be offering educational programs:

Private Pesticide Applicator Training is scheduled for the morning of Wednesday, February 29 at the Dakota County Extension and Conservation Center in Farmington. This will be the last training offered for applicators whose licenses expire March 1, 2012. Watch for a reminder postcard this winter.

Crops Day highlighting the latest in nutrient, pest, and general crop management and will be held in early March. More details will be available soon.

After the crazy growing season we had this year, I hope you've had a safe and successful harvest!

Phyllis Bongard
Agriculture Production/Water Quality

For more information

Phyllis Bongard
Agriculture Production/
Water Quality
Dakota County Extension &
Conservation Center
4100 220th St. W, Suite 101
Farmington, MN 55024

651-480-7757

phyllis.bongard@co.dakota.mn.us

Printed on 30% recycled paper/post-consumer waste.

Nitrogen application rates

November 2011

2

Vol. 5 No. 3

Five years ago, the University of Minnesota changed its approach toward fertilizer N recommendations in corn. After years of basing recommendations on yield goals, the new guidelines took economics and a farmer's attitude towards risk into account (Table 1). The new guidelines suggest an acceptable N rate range based on the cost of fertilizer and corn price. For example, if N costs \$0.50 per pound and corn is \$5 per bushel (0.10 ratio), the guidelines recommend between 120 and 165 lb. fertilizer N per acre for corn following corn. A producer who is more risk-averse may want to use rates at the higher end while producers with water quality concerns may want to apply rates towards the low end of the range.

Table 1. Guidelines for use of nitrogen fertilizer for corn grown on soils considered to be highly productive.

N Price/Crop Value Ratio	Corn/corn		Corn/soybeans	
	MRTN	Acceptable range	MRTN	Acceptable range
	lbs N/acre			
0.05	155	130 to 180	120	100 to 140
0.10	140	120 to 165	110	90 to 125
0.15	130	110 to 150	100	80 to 115
0.20	120	100 to 140	85	70 to 100

MRTN= maximum return to nitrogen
 Source: Rehm, G., et. al, 2006, Fertilizing corn in Minnesota, University of Minnesota Extension

How well do these recommendations work in Dakota County? With help from local producers, we started testing the new recommendations on both loamy and sandy soils in 2007 in several locations.

Figure 1. Corn grain yields at varying rates of nitrogen fertilizer on irrigated loamy soils in Dakota County, 2007-2009.

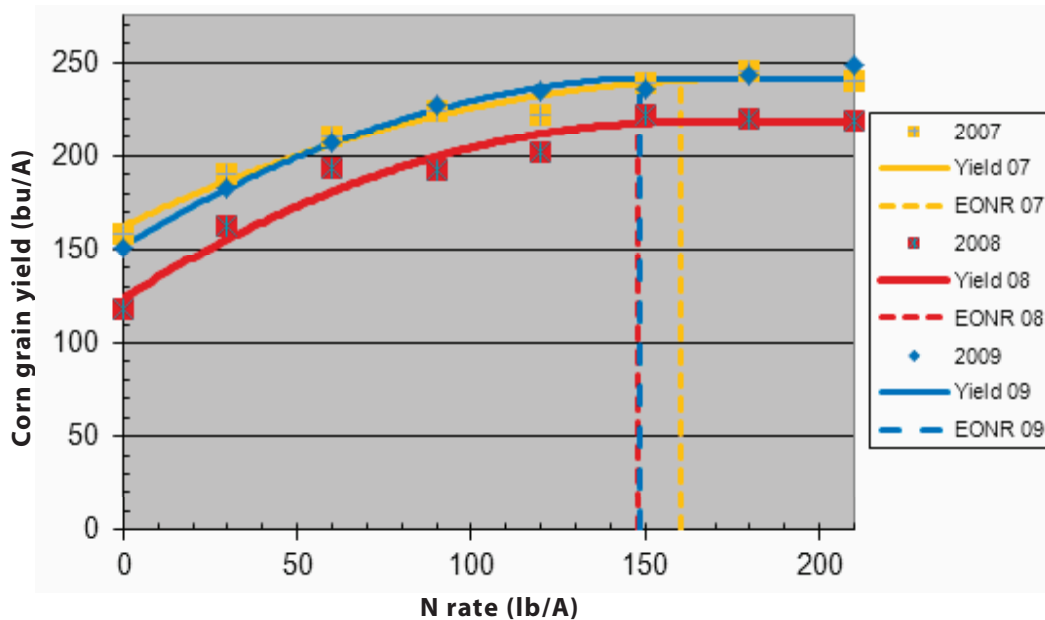


Figure 1 shows the yield results on loamy soils at these locations over three years. The solid lines represent yield responses to nitrogen, while the vertical dashed lines represent the nitrogen rate where returns over N costs were maximized (EONR-economic optimum N rate). Nitrogen rates above the EONR did not result in enough of a yield increase to pay for the additional fertilizer. You can see that the optimum N rates on these loamy soils generally fall within the “new” University guidelines (Table 2).

Year	Township and section	Soil	Previous crop	EONR ¹
2007	Hampton, section 34	Wadena loam	Corn	160
2008	Hampton, section 35	Marshan silty clay loam	Peas, sweet corn	148
2009	Ravenna, section 7	Wadena loam	Soybeans	148
¹ EONR ratio (N price/crop value) of 0.10.				

Fall applications of fertilizer N

As tempting as it is -- it's crunch time and applying fall N is a time-saving practice -- applying fertilizer N in the fall is not recommended anywhere in Dakota County, even with inhibitors. This recommendation holds regardless of whether soils are sandy or loamy. This is due to the County's very permeable underlying geology, which does not provide an effective barrier to any leached nutrients or pesticides on their way to groundwater.

What times of application are recommended for loamy soils in the County? Spring preplant applications of ammonia and urea or split applications of ammonia, urea and UAN are highly recommended on these finer-textured soils.

Other Best Management Practices (BMPs)

- Take credit for previous legume crops and manure (see “Fertilizing Corn in Minnesota” and “Manure Management” in Additional Resources).
- Incorporate broadcast urea or preplant UAN within 3 days of application to reduce N losses.

Basal stalk nitrate

How should basal stalk nitrate-nitrogen results be interpreted? This test, taken at the end of the growing season, was developed to distinguish between fertilizer N applications that had been adequate and those that had been excessive. Since it is a “post-mortem” assessment, it can't be used to predict future fertilizer N needs, but it is a way to look at N rates of the season just ended.

The following table from Minnesota Crop eNews includes suggestions for interpreting results:

Basal stalk nitrate-nitrogen (ppm)	Range	Suggested interpretation
0-250	Low	Nitrogen was likely deficient during the growing season
250-700	Marginal	Possible that a nitrogen shortage limited yield
700-2,000	Optimum	Yield not limited by nitrogen shortage
>2,000	Excessive	Nitrogen rate was too high or some production factor caused a yield reduction.

New Nutrient Management website

University of Minnesota soil scientists have launched a comprehensive new nutrient management website. For more information on all of the topics above and many more, visit <http://www.extension.umn.edu/nutrient-management/>.

Additional resources

- **Fertilizing Corn in Minnesota, George Rehm, et.al., 2006**
(<http://www.extension.umn.edu/nutrient-management/Docs/corn-fertilization-2006.pdf>)
- **Best Management Practices for Nitrogen Use in Southeastern Minnesota, Gyles Randall, et.al., 2008** (<http://www.extension.umn.edu/nutrient-management/Docs/08557-southeastMN.pdf>)
- **The Basal Stalk Nitrate Test for Corn, George Rehm, 2005**
<http://www.extension.umn.edu/capacity/afe/cropenews/2005/05MNCN40.htm>
- **Manure management**
<http://www.extension.umn.edu/nutrient-management/manure-management/>

The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the University of Minnesota Extension is implied.

What's inside?

- Nitrogen application rate
- Nitrogen rate studies on finer-textured soils
- Best management practices
- Resources to fine-tune N management

Phyllis Bongard
Agriculture Production/Water Quality
Dakota County Extension & Conservation Center
4100 220th St. W, Suite 101
Farmington, MN 55024-9539