

How MRTN Manages Nitrogen Costs in Corn
By Nick Schneider, Winnebago County Agriculture Agent

When it comes to fertilizing a corn crop, growers face a significant dilemma in the 2008 growing season. The combination of record high nitrogen prices and near record high crop prices has growers asking, “Should I change my nitrogen rate? But I don’t want to sacrifice productivity!”

Fortunately, late in 2005 a new strategy for determining nitrogen rate was released by the University of Wisconsin. The maximum return to nitrogen (MRTN) rate is based on determining the most economical nitrogen rate for corn. This method is called “MARTIN” by crop professionals whom have been working with it for the past couple of years. While more complicated than the past nitrogen rate system, the MRTN approach is ideal for circumstances such as now where prices are in uncharted territory.

Here are the steps:

Step 1: Determine the N:corn price ratio. Divide the price of one pound of N by the price of one bushel of corn. For example $\$0.45 / \text{lb N} \div \$4.50 / \text{bu corn} = 0.10$.

Step 2: Describe the soil. Does the soil have a high/very high yield potential, medium/low yield potential, or is it sand/sandy loam? The nitrogen recommendation is adjusted based on these three soil groups.

Step 3: What is the previous crop? Within the soil yield potential group, there is another layer of adjustment based on previous crop. Base nitrogen recommendation will be the same when the previous crop was corn, forage legumes, legume vegetables, or green manures. As in the past, the nitrogen credit from legumes and green manures will need to be subtracted from the recommended nitrogen rate. When the previous crop is soybeans or small grains, the nitrogen rate recommended is lower; however the reduction is not uniform across all soils and N:corn price ratios. The rule of thumb that soybeans are worth a 40 lbs/a nitrogen credit no longer is used in corn.

At any given N:corn price ratio, soil yield potential, and previous crop there now is a nitrogen recommendation range with an ideal rate signified in bold type. For example, if the N:corn price ratio is 0.10, the soil has a medium/low yield potential, and the previous crop is soybeans, then the recommended range is 45 to 70 lbs/a nitrogen.

In order to target the rate even further within the nitrogen rate range, these additional guidelines can be followed.

- For maximum silage yield, use N rate for the 0.05 price ratio. To adjust rates for silage, use price ratio that reflects typical prices for nitrogen and grain.
- If >50% residue at planting, use upper end of range.
- If all nitrogen is from organic sources, use top end of range. Plus, up to 20 lb N/acre as starter may be used.
- For medium & fine-textured soils with >10% soil organic matter, use low end of range; <2% OM, use high end of range.
- For coarse-textured, medium yield potential soils with <2% OM, use high end of range; >2% OM, use mid to low end of range.
- When corn follows small grains on medium & fine-textured soils, use the mid to low end of range.

- For irrigated, medium yield potential soils, use rates for high yield potential soils.
- If potential for carry-over (residual) N, use low end of range or use the high end and subtract soil nitrate test (PPNT) credits.

A pocket guide for determining MRTN is available from <http://ipcm.wisc.edu/Publications/tabid/54/Default.aspx> under the heading “Nitrogen Guidelines for Corn in Wisconsin”. The MRTN method is explained in great detail within Chapter 6 of UWEX publication *A2809 Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin*.

Iowa State University also has a great website called “Finding the Maximum Return to N and Most Profitable N Rate”. You are able to select Wisconsin soils, enter the corn and fertilizer price and you will be supplied with the recommended nitrogen rate. This calculator is found at: <http://extension.agron.iastate.edu/soilfertility/nrate.aspx>

 Nitrogen Guidelines for Corn in Wisconsin		N: Corn Price Ratio (see other side)			
		0.05	0.10	0.15	0.20
SOIL	PREVIOUS CROP	LBS N/ACRE (total to apply) ³			
high/very high yield potential soils	Corn, Forage legumes, Legume vegetables, Green manures ⁴	165 ¹ 135-----190 ²	135 120-----155	120 100-----135	105 90-----120
	Soybean, Small grains ⁵	140 110-----160	115 100-----130	100 85-----115	90 70-----100
medium/low yield potential soils	Corn, Forage legumes, Legume vegetables, Green manures ⁴	120 100-----140	105 90-----120	95 85-----110	90 80-----100
	Soybean, Small grains ⁵	90 75-----110	60 45-----70	50 40-----60	45 35-----55
sands/loamy sands	Irrigated—All crops ⁴	215 200-----230	205 190-----220	195 180-----210	190 175-----200
	Non-irrigated—All crops ⁴	120 100-----140	105 90-----120	95 85-----110	90 80-----100

1-3-2006-10M ¹ Maximum return to N (MRTN) rate. ² Range within \$1/acre of MRTN rate. ³ Includes N in starter. ⁴ Subtract N credits for forage legumes, legume vegetables, animal manures, green manures. ⁵ Subtract N credits for animal manures and second year forage legumes.