

PROTOCOL FOR ON-FARM RESEARCH TO VALIDATE WISCONSIN'S MRTN N RATE GUIDELINES

Contact Information:

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Goal of the Research:

Determine corn yield response to applied nitrogen (N) to evaluate Maximum Return to Nitrogen (MRTN) N rate guidelines for a range of Wisconsin soils and cropping systems.

Rationale:

MRTN N rate guidelines for corn were introduced in fall 2005 to address the changing economics of N use in corn production. Although corn yield response to N has not changed, the rates of N that result in maximum economic return at prevailing corn and nitrogen prices have fluctuated in recent years. Implementation of MRTN N rate guidelines for corn in Wisconsin will be promoted and strengthened by corn N response experiments to evaluate the performance of MRTN N rate guidelines in a range of corn production environments.

1) Site Selection:

- a) Medium yield potential soils (MYPS) with previous crop soybean are the highest research priority, but other soils and previous crops will make valuable contributions.
- b) Previous crops; corn, soybean, vegetable crops, or small grains.
- c) Avoid sites with first or second year corn after alfalfa or a forage legume.
- d) Avoid sites where manure or other organic N sources have been applied in the last three years.
- e) Uniform soils typically used for corn production.

2) Site History/Background Information:

- a) Soil name and texture
- b) County
- c) Five-year crop history (with yield history if available)
- d) Five-year manure history with application rates (if applicable)
- e) Irrigation (yes/no)
- f) Latitude and longitude of the field if known

3) Current Year Site Data:

- a) Tillage
- b) Corn hybrid, relative maturity, planting date
- c) Current year non-N fertilizer applied, rate, analysis and placement
- d) Starter fertilizer applied, rate, analysis and placement (Note: starter N rate should not exceed 20 lb N/acre)
- e) Pre-harvest stand count (Count plants in at least 50 ft of row in each replication)
- f) Harvest date
- g) Optional - Pest management program (weed control, insecticide, others)

4) Soil Samples to be Taken:

- a) Routine soil test results (pH, organic matter, P and K)
 - i) Collect one sample consisting of at least 10 cores to a depth of 6 to 7 inches from each replication in the experiment.
- b) Preplant soil nitrate test
 - i) Collect one sample consisting of at least three cores from the 0-1 and 1-2 ft depths from each replication in the experiment.
- c) How to submit soil samples
 - i) Samples must be sent to the University of Wisconsin Labs at Madison or Marshfield.
 - ii) Accounts will be/have been set up to cover costs.
 - iii) Results will be returned to the cooperator and must be entered in the data collection Excel file.

5) Yield Measurements:

- a) Harvest methods
 - i) Yield monitor (Calibrated)
 - ii) Weigh wagon
 - iii) Hand harvest (minimum of two 25-ft lengths of row)
- b) For all methods, data must include yield in bu/acre and % grain moisture

6) Experimental Design:

- a) Randomized complete block design with three replications (See example plot diagram). Plot size is flexible. Harvested area must be the same in all replications.
- b) Treatments
 - i) Medium yield potential soils (MYPS): 0, 40, 80, 120, 160, (200) lb N/acre
 - ii) High yield potential soils (HYPS): 0, 40, 80, 120, 160, 200 lb N/acre
- c) Nitrogen treatment application timing
 - i) Timing should be selected to minimize N losses on the soil at the experimental site.
 - ii) On medium- and fine-textured soils, preplant N applied within approximately 2 weeks of planting is acceptable if N treatments can be relocated after planting.
 - iii) Other times of N application may include post plant pre-emergence, or sidedress (may include split sidedress applications).
- d) Nitrogen sources
 - i) Urea or 28-32% UAN solutions must be injected or incorporated within 24 hours of application.
 - ii) Anhydrous ammonia, ammonium nitrate, ammonium sulfate are also acceptable N sources

7) Data Collection:

- a) Complete the data collection Excel file. This file provides a template for all of the site information and yield data that is needed. The Excel file can be found at: <http://www.soils.wisc.edu/extension/onfarmdemo/>
- b) The data collection file should be named in the following manner: county-year-N rate trial.xls
Example: Dane-Laboski-2008-N rate trial.xls
- c) Email the completed data collection file to Todd Andraski (andraski@wisc.edu)

Example Plot Diagrams

Numbers within the diagram are N rates in lb N/a.

200	0	120	160	80	40	Rep 3
0	160	40	80	200	120	Rep 2
200	40	0	80	160	120	Rep 1

OR

200	0	120	160	80	40	0	160	40	80	200	120	200	40	0	80	160	120
————— Rep 1 —————						————— Rep 2 —————						————— Rep 3 —————					