Nebraska On-Farm Research: Precision Nitrogen Management Project
Utilizing Crop Model Based Tools for Corn N Management

Questions about this protocol? Contact Dr. Laila Puntel | lpuntel2@unl.edu | 402-472-6449

Objective

The following is the protocol for testing crop model-based N tools (e.g., Granular, Adapt-N, Farmers Edge) and comparing them to the producer's usual N management and the on-farm economic optimum N rate (EONR). This protocol may be used for those with pre-plant only N capabilities, in-season N capabilities, variable-rate capabilities, or flat-rate only capabilities.

Why Participate?

Participating in this study will allow you to try and learn about new technologies and evaluate what techniques will improve N management on your farm. You will work closely with Nebraska Extension to accomplish the project. We hope this study provides valuable information for your operation. In addition, in aggregate, these studies will provide valuable information to improve N management in Nebraska.

All cooperating producers will receive $1,300 per study in recognition of their time and resource commitments and to mitigate the risk of potential yield loss. Producers will be able to access a subscription to the selected service for the trial area or apply for reimbursement for subscription costs if needed.

Study Details

Layout: A total of 4 replications are needed for this trial (Figure 1). Rows planted in each treatment need to be equal to or greater than corn head width. The same hybrid and management practices should be used across the entire study area.

Treatment 1: Grower Standard Practice (blue). This treatment would represent the common N management practice used by the producer every year (Figure 1).

Treatment 2: Precision N Practice (pink). This practice will utilize a model to determine the N rate. There are a number of commercially available models that can be used. These models may be suited for pre-plant, sidedress, variable-rate, or a combination. The model selection will be based on the producer's current management, equipment available, crop management strategy, and data availability. We currently have agreements for growers to utilize the Adapt-N model, Granular model, or Maize-N model.

Optional - Economic optimum nitrogen rate: Where possible, N rate blocks will be established at 3-4 locations in the field near the field length treatment strips (Figure 1). Rate blocks will be 300-feet long and twice the width of the harvester head. Four to five N rates will be use within each rep with increments of 25-50 lb/ac. Blocks would be located at contrasting "zones" within the field (e.g. high yield vs low yield; high slope vs non-slope). Timing of establishment of the N blocks will follow both the producer and the "next level" of N application (e.g. planting or split-application). Knowledge from the producer, yield monitor data, or grid sampling will be used to determine the location of the blocks.
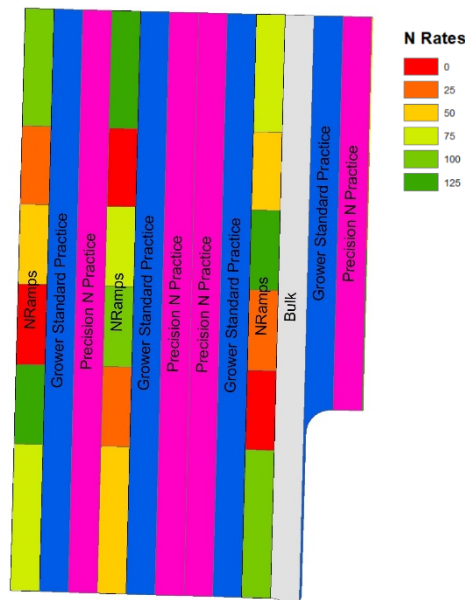
Figure 1. Generic treatment layout. Blue strips: Gower's standard management practices; Pink strip: precision N practice (e.g. crop model based tools); Green and red blocks: N rates for EONR calculation (optional).

Grower Requirements

Site Selection:

- ☐ No previous cover crop?
- ☐ No manure applications in last 10 years?
- ☐ No cattle grazing on corn stalks?
- ☐ Corn-soy or corn-corn rotation?

Are you willing to:

- ☐ Plant only 1 hybrid in study field?
- ☐ Flag or mark GPS location of each treatment?
- ☐ Provide all necessary inputs for crop production
- ☐ Complete background agronomic form about site and practices?
- ☐ Collect yield data with a **well calibrated** yield monitor? (Contact UNL Extension if assistance with this process is needed.)
- ☐ Submit harvest data to UNL Extension within 30 days of harvest or by Dec. 15?
- ☐ Allow UNL Extension to use submitted and collected data for research, educational, and informational purposes?
- ☐ Willing to work closely with the software provider and the UNL researchers to set up field simulations and to make sure the tools is used correctly? UNL researchers (Dr. Puntel and Laura Thompson) or company representatives will manage the platform, set up the fields, the inputs, and running the prescriptions.

If yes on all of the above you are a great candidate for this study. Please proceed with the questionnaire below to help us plan the best study scenario for you:

- Approximately how many years of yield monitor data do you have? _____

- Do you have soil samples for your field? If yes, please indicate if they are grid, zone, or whole field, and the last year sampled. _____

- Do you have apparent electrical conductivity maps for your field?_____

- Do you have elevation maps for you field? _____

- Which crop model-based N tool are you interested in using (Granular, Adapt-N, Maize-N, other)?
_____

- Do you have pre-plant N capability? _____

- What form of N do you apply pre-plant? _____

- Do you have variable rate capabilities for pre-plant N? _____

- Do you have in-season N capabilities or willing to hire in-season N application?_____

- What form of N do you apply in-season? _____

- Do you have variable rate capabilities in-season or willing to hire? _____

- Irrigated or non-irrigated? _____

- Farm/field location? _____

- Describe you current N management plan: _____
_____
_____
_____

- Any field history we should know about? For example, was there a study conducted on this field in the past 5 years? Have you managed this field differently in the past? Was part of the field a feedlot, old farmstead, etc? _____
_____
_____

For those that implement the optional economic N rate blocks:

- The UNL team has partnered with Granular to be able to conduct enhanced data collection on the optional economic optimum N rate blocks. You have the option to opt in or out of this partnership. Opting in will allow us to better understand the economic optimum N rate at your site, develop better recommendations in the future, and improve the technology that is evaluated on your site. We will work with Granular to collect many additional measurements on the site, including detailed soil characterization of texture, OM, pH, and macro and micronutrients, soil ammonium and nitrate data throughout the growing season, and biomass/tissue samples. You will have access to all the data we collect. The yield data from the N-rate strips will be shared with Granular. You will not share the field length strip data unless you opted to use the Granular model. If you opt to use a different model (Adapt-N, Maize-N, Farmers Edge, etc.) the Granular N rate blocks could still be conducted as we will just work with Granular on the N rate ramp portion of the study. As always, data will be reported in aggregate or anonymously. We are happy to visit more and discuss your questions or concerns.
  ☐ Opt in   ☐ Opt out   ☐I need more information and would like to visit with the research team

Because this study is sponsored by USDA-NRCS, all participants will need to complete an eligibility check. Please respond to the following two questions to help the NRCS begin the assessment.

1. Are you currently a participant in USDA Farm Programs? ☐ YES   ☐ NO
2. Have you ever had, or do you currently have, an EQIP or CSP contract with NRCS? ☐ YES   ☐ NO

Name _____

Address _____

County _____

Farm number (if known) _____

Tract number of field to be used for the study (if known) _____