

# Nebraska On-Farm Research: Precision Nitrogen Management Project

## Precision Nitrogen Winter Wheat Protocol

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### Objective

The following is the treatment design for testing next level of N management tools 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.

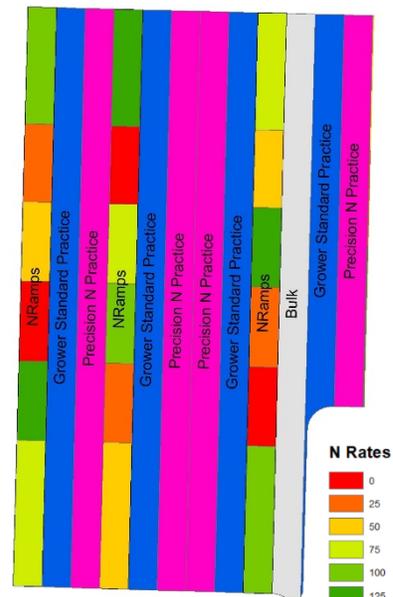
### Why Participate?

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, 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 wheat head width. The same variety and management practices should be used across the entire study area.



**Figure 1.** Generic treatment layout. Blue strips: Gower’s standard management practices; Pink strip: precision N practice (e.g. split application); Green and red blocks: N rates for EONR calculation (optional).

*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: Next Level N Management (pink).*

- a. Add or change Split-N application - such as 50/50, 30/70, or 30/40/30. Pre-planned N rate, but change in timing. Timing of fertilizer application is flexible based on the planting date, weather and soil conditions, extent of tillering, and target growth stages based on current knowledge.
- b. Split-N based on sensor (e.g. Greenseeker, RapidScan). Which algorithm to use? Timing and rate of fertilizer application is flexible based on the planting date, weather and soil conditions, extent of tillering, growth stage, and sensor readings
- c. Split-N based on imagery (e.g. [Varimax](#)). Timing and rate of fertilizer application is flexible based on the planting date, weather and soil conditions, extent of tillering, growth stage, and imagery feedback/analysis. Width of fertilizer strips may need to be wider than needed to utilize Satellite imagery (resolution is 33 feet).
- d. Crop model-based decision support tool (e.g. Flurosat). This practice will utilize a model to determine the N rate. The model approach 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 Flurosat platform.
- e. Specialized N formulations such as slow-release (polymer coated N) or N with urease and/or nitrification inhibitor. Rate of application can be 100% or 85% of your regular N input. Timing of application can be 30/70 split in fall and spring.

*Treatment 3 (Preferred) - Economic optimum nitrogen rate:* Nitrogen rate blocks will be established at 4 locations in the field near the field length treatment strips with split or spring applications (Figure 1). Maximum fall N application of 33% of expected total N rate or maximum of 30 lbs of fall nitrogen. In the spring nitrogen rate increments of 15-30 lbs will be applied to create 4-5 different rates. Example would be a total of 30, 45, 60, 75, and 90 lbs of N per acre for the 5 rates.

## 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 cultivar in the 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 August. 15th?
- Allow UNL Extension to use submitted and collected data for research, educational, and informational purposes?

**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. \_\_\_\_\_
- Which next level of N management are you interested in using (split N application, sensors, images)?  
\_\_\_\_\_
- 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 micro nutrients, 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) \_\_\_\_\_

**Disclaimer:** The Nebraska On-Farm Research Network does not endorse the use of products tested in on-farm replicated strip trials. While treatments are replicated within trials and may be replicated across multiple sites under various conditions, your individual results may vary.

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