



Nebraska On-Farm Research Network

In-Season Nitrogen Decision Tool Evaluation Protocol

Protocol developed by: UNL Agronomy & Horticulture; Laura Thompson and Nathan Mueller, UNL Extension Educators and Charles Shapiro, UNL Soil Fertility Specialist

Objective: Evaluate new tools for in-season N rate determination.

Rationale: Applying a portion of total N fertilizer during the growing season improves nitrogen use efficiency. Sidedress application is an efficient N management practice. When sidedress applications are planned, pre-plant applications can be reduced – pre-plant N application rates depend on the soil types, yield goals, and timing of sidedress application. Sufficient N needs to be available for corn growth until sidedress application while leaving a significant amount of N to be applied in-season. New tools are available for recommending in-season N rates based on in-season conditions. Available tools include: [Climate FieldView™ Nitrogen Advisor](#), [EncircaSM Services from DuPont® Pioneer®](#), [FarmLogs](#), [adapt-N](#), and [Maize-N](#). Use the following protocol to evaluate one of these tools in your operation. This protocol is designed for evaluating a static-rate model. For models providing variable rate recommendations, modifications may be needed; please contact one of the educators at the end of this protocol.

One example tool is the Climate FieldView™ Nitrogen Advisor tool. This tool models field-level nitrogen supply and is used to determine the N needed in your field to provide nutrients when the plant needs them. As of June 2016, first time users can try the tool for free for 120 acres. While this protocol is designed using the example of the Climate FieldView™ Nitrogen Advisor tool, other tools may also be evaluated in a similar manner. Additional planning will be needed to evaluate tools which provide a variable rate nitrogen recommendation.

Procedure: This protocol is designed for growers who are already applying a portion of their nitrogen in-season. The [Climate FieldView™ nitrogen advisor tool](#) would be used at the time of your in-season application. This protocol assumes only one in-season N application will be made. The nitrogen advisor will predict the amount of nitrogen that will be available to the plant at the end of the growing season. This trial does not require a guidance system or yield mapping capabilities but these are preferred. The same hybrid and management practices (other than N) should be used across the entire study area. For more information on setting up an on-farm research trial, consult Nebraska Extension's [Grower's Guide to On-Farm Research](#).

There are two options for this study: option 1 is a direct comparison between the in-season N decision tool and the grower's standard in-season N rate, option 2 brackets the in-season N decision tool recommendation with a rate higher and lower than recommended.

In this protocol, the "Climate FieldView™ sidedress rate" will be the amount of N deficit indicated by the nitrogen advisor tool plus 30 lbs/acre of N at the time you plan to sidedress. This rate should be adjusted based on conversations with your local Climate FieldView™ service provider.

*****NOTE!** Nitrogen is a mobile nutrient and corn roots will spread laterally (i.e. corn plants can take up N from up to a row away). Therefore, the width of the treatment strips shown in the treatment diagrams account for this with a "buffer" between the different treatments. This "buffer" area is not used for the yield comparison.

Option 1 - Direct Comparison: The in-season N decision tool is compared to the grower determined in-season N rate. The two treatments in this option are:

- Treatment 1: Climate FieldView™ Sidedress Rate (amount of N deficit indicated by the tool plus 30 lbs/acre).
- Treatment 2: Producer Sidedress Rate (This is a rate determined by the producer. A number of different strategies may be used to determine this rate such as the pre-sidedress nitrate test, UNL N recommendation algorithm, or an N rate determined by another available model or tool.)

Option 1 Treatment Diagram Example: The paired comparison design is used for this trial. A total of 7 replications should be implemented and harvested. (Note, actual rows indicated may vary based on your equipment widths.)

Replication	N Application	Harvest
Rep 1	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 2	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 3	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 4	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 5	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 6	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 7	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 2: Producer’s sidedress N recommendation	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer

Option 2 – Bracketing the Climate FieldView™ Nitrogen Advisor Recommendation: The Climate FieldView™ Nitrogen Advisor is compared to a rate 50 lbs/acre higher and 50 lbs/acre lower. (Rates other than 50 lbs/acre higher and lower can be used; differences less than 30 lbs/acre are not recommended.) There are three treatments in this option:

- Treatment 1: Climate FieldView™ Nitrogen Advisor Sidedress Rate
- Treatment 2: Climate FieldView™ Nitrogen Advisor + 50 lbs N/ac
- Treatment 3: Climate FieldView™ Nitrogen Advisor – 50 lbs N/ac

Option 2 Treatment Diagram Example: The randomized complete block design is used for this trial. A total of 4 replications should be implemented and harvested. (Note, actual rows indicated may vary based on your equipment widths.)

Replication	N Application	Harvest
Rep 1	(16 rows) Treatment 3: Climate FieldView™ Nitrogen Advisor - 50 <i>(Treatment 1 Rate – 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	16 rows) Treatment 2: Climate FieldView™ Nitrogen Advisor + 50 <i>(Treatment 1 Rate + 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 2	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 3: Climate FieldView™ Nitrogen Advisor - 50 <i>(Treatment 1 Rate – 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	16 rows) Treatment 2: Climate FieldView™ Nitrogen Advisor + 50 <i>(Treatment 1 Rate + 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 3	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	16 rows) Treatment 2: Climate FieldView™ Nitrogen Advisor + 50 <i>(Treatment 1 Rate + 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 3: Climate FieldView™ Nitrogen Advisor - 50 <i>(Treatment 1 Rate – 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
Rep 4	(16 rows) Treatment 3: Climate FieldView™ Nitrogen Advisor - 50 <i>(Treatment 1 Rate – 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	16 rows) Treatment 2: Climate FieldView™ Nitrogen Advisor + 50 <i>(Treatment 1 Rate + 50 lbs N/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer
	(16 rows) Treatment 1: Climate FieldView™ Sidedress <i>(Amount of N deficit indicated by the tool plus 30 lbs/acre)</i>	←4 rows buffer ← Record Yield from center 8 rows ←4 rows buffer

Grower Requirements:

1. Flag or **mark** GPS location of each treatment and note which row the flag is marked in.
2. Provide all necessary **inputs** for crop production.
3. Complete a [background agronomic form](#) about site and practices. Print or save the recommendation or screen captures from the in-season N decision tool for future reference (Record recommended rate or deficit and range if provided). Document irrigation amounts during the growing season and nitrogen applied with irrigation.
4. Collect **yield data** and **grain moisture** with weigh wagon or yield monitor for each strip. If using yield monitor, please designate a separate “load” for each treatment and set up separate “products” names for each treatment harvested. Yield monitor must be **well calibrated**. Contact UNL Extension if assistance with this process is needed (visit <http://cropwatch.unl.edu/farmresearch> for contact info).
5. Collect stand counts at harvest. 3 counts of 1/1000 of an acre should be taken for each strip and averaged together to end up with one stand count for each strip.
6. *Optional* – collect and analyze stalk nitrate tests at physiological maturity for each treatment/strip. [Reference for sampling methodology and interpretations](#)
7. Submit harvest data to UNL Extension within 30 days of harvest or by Dec. 15 of the harvest year.
8. Allow UNL Extension to use submitted and collected data for research, educational, and informational purposes.

Nebraska On-Farm Research Network will:

1. Provide technical assistance in setting up replicated and randomized experimental design.
2. Provide assistance upon request with treatment implementation, flagging, stand counts, stalk nitrate tests, and recording yield.
3. Analyze raw data using statistical analysis and provide this information to the grower.

For assistance with studies, please contact:

Laura Thompson: laura.thompson@unl.edu or 402-624-8033

Nathan Mueller: Nathan.mueller@unl.edu or 402-727-2775

Or your local Extension Educator

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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