Nebraska On-Farm Research Network

UNL Pre-Plant Corn Nitrogen Recommendation vs. UNL Nitrogen Recommendation Variable Rate

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Objective: Verify that the N rate can be profitably varied according to recent yield history of the field.

Rationale: UNL research consistently confirms that when N is considered to be non-limiting to crop growth, each addition of N fertilizer results in less yield gain. This results in lower N use efficiency and lower net return. This is attributed, at least partly, to the high N use efficiency possible with crops that have healthy and well-developed root systems efficient in nutrient recovery and have plants that are efficient in converting nutrients and carbohydrates to yield (i.e. internal or physiological efficiency). The UNL N recommendation has been **validated** for maximizing profitability for high yielding environments (i.e. >240 bu/ac), as well as lower yield environments over diverse production situations. However, many producers feel that N in excess of the recommendations is needed; this results in reduced profitability and more N loss to the environment. Additionally, applying a portion of total N fertilizer during the growing season (sidedress) has been shown to improve nitrogen use efficiency (NUE).

Procedure: The two treatments in these trials are:

Treatment 1: UNL N recommendation with yield goal set using field average
Treatment 2: UNL N recommendation varied by adjusting expected yield goal based on at least 2 years of historical yield data.

This trial requires variable rate N application capability and yield mapping. Residual nitrate-nitrogen sample is required for the UNL N recommendation.

The UNL nitrogen rate can be determined using the following spreadsheet (use the tabs at the bottom of the spreadsheet for help and instructions). (If link does not work visit the www.cropwatch.unl.edu/farmresearch and click on the research protocols page.)

Treatment Design: With two treatments for this trial we are able to use the paired comparison design below. A total of 7 replications should be implemented and harvested. The same hybrid and management practices (other than N) should be used across the entire study area.

***NOTE!** When designing a nitrogen comparison you need to remember 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 below must take this into account and compensate for it. We compensate for this by allowing for a "buffer" between the different treatments. This "buffer" area is not used for the yield comparison. For example, if you have a 16 row nitrogen applicator and an 8 row corn head, you will need to harvest the center 8 rows of each 16 row treatment, leaving 4 rows on each side of each treatment strip as "buffer". This area will be harvested but not included in the yields for statistical analysis of the treatments. The following layout demonstrates a 16 row applicator and 8 row corn head. If you have different equipment sizes you will need to adjust accordingly. If you have any questions about the treatment design when working with N, please contact the Nebraska On-Farm Research Network.

Replication	N Application	Harvest
Rep 1	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
Rep 2	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
Rep 3	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
Rep 4	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
Rep 5	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
Rep 6	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
Rep 7	(16 rows) Treatment 1: UNL N Rate calculated with field average for yield goal	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*
	(16 rows) Treatment 2: UNL N Rate with varied yield goal based on 2+ years historic yield differences	←*4 rows buffer* ← **Record Yield** from center 8 rows ←*4 rows buffer*

Grower Requirements:

1. Flag or **mark** GPS location of each treatment.
2. Provide all necessary **inputs** for crop production.
3. Complete a **background** agronomic form about site and practices.
4. Collect **yield data** and **grain moisture** with weigh wagon or yield monitor. 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.
5. Collect stand counts at harvest. Each treatment in all replications should have a stand count recorded. It is recommended that at least 3 counts be averaged together for each reported stand count.
6. Submit harvest data to UNL Extension within 30 days of harvest or by Dec. 15 of the harvest year.
7. 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 rot tests, and recording yield.
3. Analyze raw data using statistical analysis and provide this information to the grower.

For assistance with studies, please contact the Nebraska On-Farm Research Network Coordinators:
Keith Glewen: kglewen1@unl.edu or 402-624-8005
Laura Thompson: laura.thompson@unl.edu or 402-624-8033
Or your local educator