

eFields

Ohio State University Extension Variable Rate Nitrogen Trial 2018 Protocol

Study Overview

The goal of this study is to determine the yield impact of various nitrogen fertilizer rates in Ohio. Information from this trial will be used to improve management recommendations for variable rate nitrogen for growers throughout the state. To maximize learning, a minimum of five different nitrogen rates should be compared. More rates can be added, if adequate space is available. The rates compared in the trial need to be different enough to have the potential to affect yield, a minimum difference of 40 lbs/acre between each treatment is recommended. It may be necessary to adjust these rates slightly based on your equipment capabilities. The high and low nitrogen rates are important to include because they make it possible to observe the response curve to nitrogen.

Proper experimental design is important to ensure the validity of the yield results at the season end. Plot replication and randomization make it possible for statistical analysis to account for the natural field variation that occurs. For this study, a minimum of three replications should be used and four replications are recommended. Plots should be randomized within each replication to eliminate bias due to plot order.

Selecting Nitrogen Rates

- A total of 5 nitrogen rates is recommended replicated no less than 3 times with 4 or 5 replications ensuring a successful study.
- Increments between selected treatment rates should be no less than 40 lbs/ac apart.
- Determine the farmer's nitrogen rate for the selected variety and use as one of the middle rates.
- Select rates above and below using the 40 lbs/ac minimum increments and make sure the farmer is comfortable with final rate treatments.

Example: Farmer typically applies 180 lbs N/ac. Suggested rates could be 100, 140, 180, 200, & 260 lbs per acre.

Field Dimensions

The field size will determine the total number of plots that can be installed. Remember, at least 3 replications per rate. Plot length is typically determined by the length of the field. All plots should be at least 500 feet long. Plot width will be determined by equipment size. It is important to take into account the size of both the N application equipment and the combine, as well as any application equipment that might impact the trial. If N is applied with the planter, this needs to be considered, as well.

- Full-width or half-width of applicator width is recommended for a plot width. It will depend on the width of the applicator plus the applicator's ability to independently control rates if a split-width setup is selected).

- If multiple N applications are planned, the plot width should accommodate the size of all applicators. Example: N applied pre-plant anhydrous (8 row) and 28% UAN sidedress (12 row), plots need to be at least 60 feet (24 row).
- Estimate the field width then divide by the selected width (full- or split- width) to determine the number of passes / plots available and if you can meet the 5 treatments by 3 replications (15 plots).
- Passes / plots no less than 500-feet (not counting headland rows) are recommended.
- Plots widths should consist of two or more combine header widths.

Suggestions

- To maximize learnings, at least 2 fields per county is recommended.
- Evaluate application equipment and combine width to make sure the selected plot dimensions align properly. Correct alignment of the application equipment and combine widths will ensure project success.
- Using the variety tracking option using an in-cab display can help manage the project. One can setup the 5 treatments by using the variety name then adding A, B, C, D or E (or similar nomenclature) at the end of each name.
 - Before starting each pass, select the treatment corresponding to the plot.
 - Example help guide for the Precision Planting 20/20 display illustrating how to create custom varieties for a project:
https://fabe.osu.edu/sites/fabe/files/imce/images/Precision_Aq/PP20_20_Adding_CustomHybrid_0.pdf

Data Collection

5 primary data needs for this project

1. Complete worksheet
2. Field boundary (lat/long of field will work at minimum)
3. As-planted data (if available)
4. As-applied data for N applications
5. Yield Monitor Data (calibrated); If a yield monitor is not available, a weigh wagon can be used to weigh the total amount harvested from each plot. Accurate plot dimensions are needed (e.g. width and length of each plot)

Example Layouts

Plot layout with 4 replications using 100, 140, 180, 220, & 260 lbs N per acre as treatments.

Planter Pass	Replication	Plot ID	Description	TRT Code
1	1	101	220	D
2		102	180	C
3		103	260	E
4		104	100	A
5		105	140	B
6	2	201	260	E
7		202	140	B
8		203	180	C
9		204	100	A
10		205	220	D
11	3	301	100	A
12		302	260	E
13		303	140	B
14		304	180	C
15		305	220	D
16	4	401	260	E
17		402	180	C
18		403	220	D
19		404	100	A
20		405	140	B