



RESEARCH PROTOCOLS

Can We Reduce Nitrogen Rate and Improve ROI?

Objectives: Determine if, in fields employing soil health management systems for at least 5 years, farmers can reduce N fertilizer application rate by 50 lb N/ac without reducing corn yield. We define soil health management systems broadly to include: cover crops, integrated grazing livestock, diversified crop rotation, etc. Ultimately, we ask: Is the ability to reduce N fertilizer application without corn yield loss a true test of soil health?

Hypothesis: Farmers who have made a long-term investment to soil health will be able to practice fertilizer reductions while maintaining corn yields. In so doing they will improve the financial viability and environmental footprint (e.g., water quality, GHG emissions) of their farm.

Farmer-Cooperator will:

- Follow Research Protocols in accordance with Project Design, Data to Collect, Photo List and Timeline detailed below.
- Take photos throughout the project. Try to capture photos that depict differences you observe between treatments such as side-by-side strips to point out differences in plant height, color, etc.
- Keep in contact with PFI with updates and questions.
- Turn in data and complete trial reflection by November 2022.

Practical Farmers of Iowa will:

- Help set up research protocol, monitor progress of project and provide support when needed.
- Conduct statistical analysis and interpretation of experimental results.
- Publish results in a PFI research report on the PFI website and potentially in other outlets.
- Provide \$1,000 research honorarium to cooperator upon receipt of data and the completed post-project survey.

Project Design:

Treatment	Description
Typical	Farmer's typical N fertilizer rate.
Reduced	Typical rate less 50 lb N/ac.

- Establish treatments in randomized, paired strips: 2 treatments × 4 replications = 8 strips total. (See map on next page.)
- Establish treatment strips by applying two N rates that differ by 50 lb N/ac. This difference can be achieved in any fashion and is left to the preference of the farmer.
 - For instance, 110 lb N/ac applied pre-plant to entire field and 50 lb N/ac side-dressed to half the strips would result in 160 lb N/ac (typical) vs. 110 lb N/ac (reduced).
- Strips must be at least as wide as one combine pass and should run the length of the field.
 - Aim for each strip to comprise ~2 acres.

	TYPICAL	REDUCED	REDUCED	TYPICAL	REDUCED	TYPICAL	TYPICAL	REDUCED
STRIP	1	2	3	4	5	6	7	8
REP	1		2		3		4	

Data to Collect (cooperator):

- Management information
 - General field history – What soil health practices have been implemented the previous 5 years?
 - During the trial, routinely document observations and management information such as seeding rates and dates, row spacing, strip dimensions, and names and amounts of products applied to strips (e.g. fertilizer, herbicide, etc.).
- Corn yield 2022
 - Record grain yield and moisture from each strip.
- Details to calculate ROIs (returns on investments):
 - Cost of fertilizer and amount applied to each strip.
 - Product costs and equipment passes unique to the two treatments.

Photo List (cooperator):

- Cover crops, grazing livestock, etc. in experiment field.
- Corn crop growing in strips throughout the season.
 - Depict any observable differences via photos of neighboring strips.
- Cooperator in experiment strips (e.g. planting, harvesting, etc.).
- Unexpected, surprising, or interesting observations!

Project Timeline:

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| <ul style="list-style-type: none"> • Review research protocol. • Complete intake survey and memorandum of understanding (MOU). |
| Spring 2022 <ul style="list-style-type: none"> • Plant corn to entire field. • Establish treatment strips by applying two N rates that differ by 50 lb N/ac. • Take photos! |
| Summer 2022 <ul style="list-style-type: none"> • Take photos! |
| Fall 2022 <ul style="list-style-type: none"> • Harvest corn from each strip on same date. • Take photos! |
| <ul style="list-style-type: none"> • Submit management info and data to PFI throughout the course of the project. • Complete trial reflection and submit all data by November 2022. • Present results at Cooperators' Meeting in December 2022. |

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The terms of this Research Protocols document are subject to the terms of the individual Research Cooperator's Memorandum of Understanding agreement with PFI. To the extent these terms may differ or conflict, the Memorandum of Understanding shall control.