PRACTICAL FARMERS OF IOWA
COOPERATORS' PROGRAM Farmer-Led Research

pfi

RESEARCH PROTOCOLS

Reduced Nitrogen Rate to Corn After Repeated Use of Cover Crops

Objective: Determine if a reduced N fertilizer rate is among the improvements to crop production resulting from repeated use of cereal rye cover crops in a corn-soybean system.
Hypothesis: N fertilizer rate for corn can be reduced by 60 lb N/ac in a field with a 7-year history of cereal rye cover crops in a corn-soybean system.

Farmer-Cooperator will:

- Follow Research Protocols in accordance with Project Design, Data to Collect and Timeline detailed below.
- Take photos throughout the project. Try to capture photos that depict the differences you observe among the treatments.
- Keep in contact with PFI with updates and questions.
- Turn in data and complete post-project survey by November 2020.

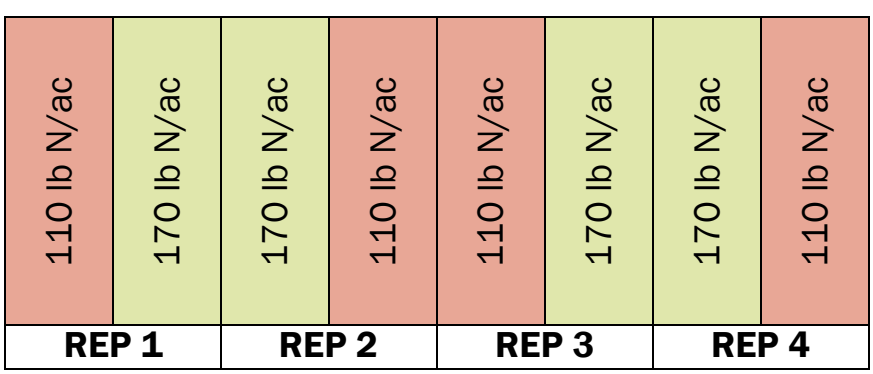
Practical Farmers of Iowa will:

- Help set up research protocol, monitor progress of project and provide support when needed.
- Publish results in a PFI research report, on PFI website and potentially other outlets.
- Provide $550 research honorarium to cooperator upon receipt of data.

Project Design:

Treatment	Description
170 lb N/ac	Typical N rate. 90 lb N/ac applied prior to corn planting; 30 lb N/ac applied at planting; 50 lb N/ac applied at sidedress in early June.
110 lb N/ac	Reduced N rate. 80 lb N/ac applied prior to corn planting; 30 lb N/ac applied at planting.

- Apply these three treatments in a randomized, replicated trial: at least four replications of randomized paired strips. 2 treatments x 4 replications = 8 strips total.
- Strips must be at least as wide as one combine pass and should run the length of the field.
    - Example layout:



Data to Collect (cooperator):

- Corn grain yield
    - Harvest and record grain yield and moisture from each strip.
- Costs
    - Fertilizer application passes and amount of N fertilizer applied.
- Optional: Late-spring soil nitrate test (LSNT)
    - When the corn is 6-12 in. tall, collect soil cores to a depth of 12 in. from each strip.
        - One sample per strip.
            - Collect samples in sets of 8 cores.
                - The first core is collected in a corn row.
                - The second is collected 1/8 of the distance between any two rows after moving to another part of the sampling area.
                - The third is collected 1/4 of the distance between any two corn rows after moving to another part of the sampling area.
                - The process is continued until the eighth core is collected 7/8 of the distance between any two corn rows.
            - At least three sets (24 cores) should be collected to comprise one sample.
- Optional: Cornstalk nitrate test
    - In late summer, after corn has reached physiological maturity, collect stalk samples from each strip.
    - Sample collection protocols from ISU:
        - https://store.extension.iastate.edu/product/Use-of-the-End-of-Season-Corn-Stalk-Nitrate-Test-in-Iowa-Corn-Production
        - https://store.extension.iastate.edu/product/End-of-Season-Cornstalk-Nitrate-Testing-Video

Project Timeline:

Fall 2019	Spring 2020	Summer 2020	Fall 2020
• Seed entire field with cereal rye cover crop.	• Terminate cereal rye cover crop before planting corn. • Apply pre-plant N fertilizer. • Plant corn. Apply N with planting. • Take photos.	• Collect LSNT soil samples. • Sidedress N fertilizer to 'typical rate' strips. • Collect cornstalk samples. • Take photos.	• Harvest corn from all strips. • Turn in data and photos. • Take post-project survey.

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