



**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.

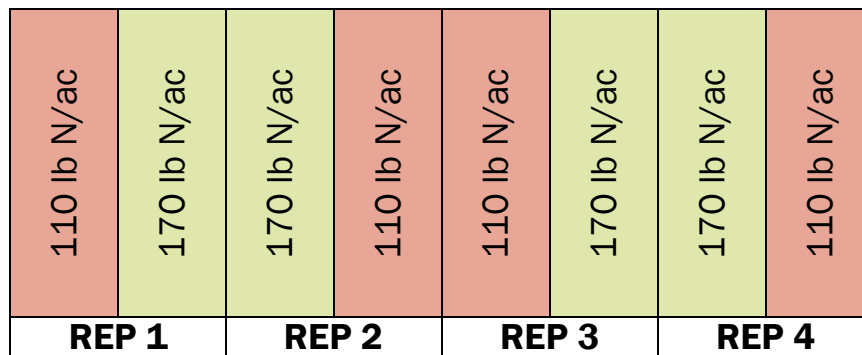
**Practical Farmers of Iowa will:**

- 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
<ul style="list-style-type: none"> <li>• Seed entire field with cereal rye cover crop.</li> </ul>	<ul style="list-style-type: none"> <li>• Terminate cereal rye cover crop before planting corn.</li> <li>• Apply pre-plant N fertilizer.</li> <li>• Plant corn. Apply N with planting.</li> <li>• Take photos.</li> </ul>	<ul style="list-style-type: none"> <li>• Collect LSNT soil samples.</li> <li>• Sidedress N fertilizer to 'typical rate' strips.</li> <li>• Collect cornstalk samples.</li> <li>• Take photos.</li> </ul>	<ul style="list-style-type: none"> <li>• Harvest corn from all strips.</li> <li>• Turn in data and photos.</li> <li>• Take post-project survey.</li> </ul>

**Contact:** Stefan Gailans, Research and Field Crops Director, (515) 232-5661; stefan@practicalfarmers.org