Objectives: Determine the effects on cover crop biomass production, cover crop biomass N production and yield of the succeeding corn crop of clover that is interseeded to a winter wheat crop in spring and terminated in the fall; clover that is interseeded to a winter wheat crop and terminated the following spring; and a cover crop mix that is seeded after winter wheat harvest in the summer that winterkills. Hypothesis: Regardless of termination date, interseeded clover will produce the most biomass and biomass N and result in greatest corn yields.

Farmer-Cooperator will:
- Take photos throughout the project and keep in contact with PFI with updates and questions.

Establish Treatments
- Spring 2019, establish at least 3 replications of treatments as shown in the diagram below.
  - Interseed clover in spring to existing winter wheat and terminate Fall 2019 (Clover – fall kill)
  - Interseed clover in spring to existing winter wheat and terminate Spring 2020 (Clover – spring kill)
  - Summer-seed mix in summer after winter wheat harvest; mix winterkills in 2019 (Mix – winter kill)
- Strips will be as wide as at least one combine pass and run the length of the field.
- Spring 2020, plant corn to all strips.

Measurements
- Summer 2019, take photos of trial progress.
  - Harvest wheat.
- Fall 2019, collect aboveground biomass samples of cover crop from strips just prior to fall kill of clover and onset of hard frost (see next page for more detail).
- Spring 2020, collect aboveground biomass samples of clover allowed to overwinter just prior to termination (see next page for more detail).
- Summer 2020, take photos of trial progress; collect soil and plant samples (see next page for more detail).
  - June: collect soil samples from each strip for late spring soil nitrate test.
  - September (physiological maturity of corn): collect cornstalk samples from each strip in corn field for nitrate analysis.
- Fall 2020, harvest corn from each strip individually.
- Turn in all info and data pertinent to this trial to Practical Farmers of Iowa by the end of the project.

Practical Farmers of Iowa will:
- Help set up monitoring 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 honorarium when all data is submitted by the conclusion of the project in 2020.

Contact: Stefan Gallans, Research and Field Crops Director, (515) 232-5661; stefan@practicalfarmers.org
Data Collection Details

Fall 2019/Spring 2020: Collect aboveground biomass samples of cover crops prior to winter 2019 (all treatments) and planting corn in spring 2020 (clover – spring kill only).

- Collect at least one sample from each strip
- Randomly place 1'x1' PVC square in strip
  - Use shears to clip all aboveground plant material from within the square
- Place all samples from a single strip into one paper bag (e.g., one paper bag per strip)
  - Label paper bags accordingly
    - Green manure cover crop:
      - Clover – fall kill
      - Clover – spring kill
      - Mix – winter kill
    - Number of squares sampled from (e.g., 3 squares = 3 ft²)
    - Date of collection
- Send paper bags to PFI office
  - Samples will be dried, weighed and sent to lab for N analysis.

June: Late-Spring Soil Nitrate Test soil sampling (corn is 6-12 in. tall)

- Collect soil cores to a depth of 12 in.
- 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.
- For more info, consult ISU Extension and Outreach publication “Use of the Late-Spring Soil Nitrate Test in Iowa Corn Production” (CROP 3140).
  - https://store.extension.iastate.edu/Product/5259

September: Cornstalk nitrate testing (after physiological maturity of corn)

- Consult these resources from Iowa State University for sample collection protocols
  - https://store.extension.iastate.edu/product/End-of-Season-Cornstalk-Nitrate-Testing-Video

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.