



RESEARCH PROTOCOLS

Green Manure Cover Crop Seeding Date and Termination Date in Winter Wheat-Corn System

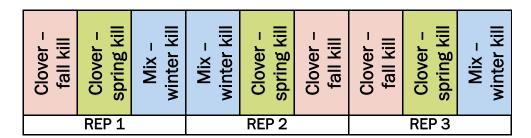
Objectives: Determine the effects on cover crop biomass production, cover crop biomass N production and yield of the succeeding corn crop of clover that is interseeded to a winter wheat crop in spring and terminated in the fall; clover that is interseeded to a winter wheat crop and terminated the following 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.
 - o 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).
 - o 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 lowa 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.

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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
 - o 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
 - o https://store.extension.iastate.edu/product/Use-of-the-End-of-Season-Corn-Stalk-Nitrate-Test-in-lowa-Corn-Production

https://store.extension.iastate.edu/product/End-of-Season-Cornstalk-Nitrate-Testing-Video