Objective: Determine the effect on weed pressure, intercropped red clover and oat yield from tine-weeding oats in an organic production system.

Hypothesis: Tine-weeding oats prior to interseeding red clover will reduce weed pressure, improve oat yield and have no effect on intercropped red clover biomass production compared to co-seeding oats and clover and no tine-weeding.

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 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:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tine-weed</td>
<td>Plant oats. Make two tine harrow passes and interseed red clover on second pass.</td>
</tr>
<tr>
<td>Control</td>
<td>Plant oats and red clover at same time. No tine harrow passes.</td>
</tr>
</tbody>
</table>

- Apply these 2 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:

```
<table>
<thead>
<tr>
<th>Tine-weed</th>
<th>Control</th>
<th>Control</th>
<th>Tine-weed</th>
<th>Tine-weed</th>
<th>Control</th>
<th>Tine-weed</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>REP 1</td>
<td>REP 2</td>
<td>REP 3</td>
<td>REP 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
**Data to Collect (cooperator):**

- Weed assessment (density and/or biomass; on same date if assessing both)
  - DENSITY: In late spring/early summer, count and record number of weeds in a 3-ft radius at seven random points along a 100-pace transect through the center of each strip.
  - BIOMASS: In late spring/early summer, sample aboveground weed growth 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 plant material from a single square into one paper bag
    - Label paper bags accordingly
      - Rep #
      - Treatment: Tine-weed or control
      - Number of squares sampled from (e.g., 1 square = 1 ft²)
      - Date of collection
    - Optional: Repeat this process 2-3 times per strip
      - (e.g., 2-3 paper bags per strip)
    - Send paper bags to PFI office
    - Samples will be dried and weighed
- Oat yield
  - Harvest and record grain yield and moisture from each strip.
- Red clover biomass
  - In fall, sample aboveground biomass 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 plant material from a single square into one paper bag
    - Label paper bags accordingly
      - Rep #
      - Treatment: Tine-weed or control
      - Number of squares sampled from (e.g., 1 square = 1 ft²)
      - Date of collection
    - Optional: Repeat this process 2-3 times per strip
      - (e.g., 2-3 paper bags per strip)
    - Send paper bags to PFI office
    - Samples will be dried and weighed and, pending funding, will be sent for lab analysis (C and N concentration).

**Photo List (cooperator):**

- Tine harrow passes; equipment in field
- Oats + red clover growing together (throughout season).
- Cooperator collecting data.
- Cooperator in field trial.

**Project Timeline:**

<table>
<thead>
<tr>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant oats to entire field.</td>
<td>Conduct weed assessment</td>
<td>Collect red clover biomass</td>
</tr>
<tr>
<td>o Co-seed clover to ‘Control’ strips</td>
<td>Harvest oats from all strips</td>
<td>from all strips.</td>
</tr>
<tr>
<td>Make two tine harrow passes in ‘Tine-weed’ strips.</td>
<td>Take photos.</td>
<td>Turn in data.</td>
</tr>
<tr>
<td>o Interseed red clover on second tine harrow pass.</td>
<td></td>
<td>Take post-project survey.</td>
</tr>
<tr>
<td>Take photos.</td>
<td>Take photos.</td>
<td></td>
</tr>
</tbody>
</table>

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