



## RESEARCH PROTOCOLS

## Decomposition of Tea as a Soil Health Indicator in Agroforestry Systems

**Objective:** Determine the different rates of soil microbial decomposition of tea under five agricultural systems that vary in their complexity from cropland to agroforestry to native forest in southwest Iowa.

**Hypothesis:** Tea will decompose at a faster rate in the agroforestry and native forest systems than the conventional crop system.

### Farmer-Cooperator will:

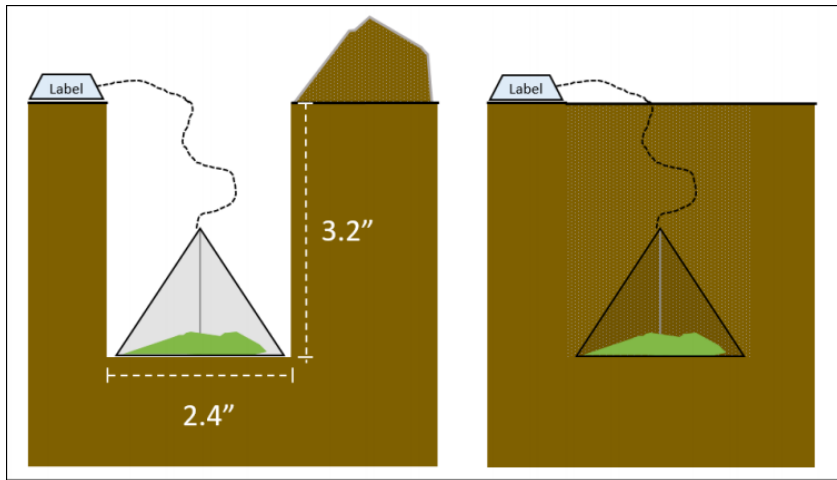
- Follow Research Protocols for study
- Take photos throughout the project
- Keep in contact with PFI with updates and questions
- Turn in all data by November 2019

### 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 cooperator payment at conclusion of project year.

### Project Design:

- Bury four sets of tea bags per McDaniel, et al. (2014) in five different agroforestry and crop treatments, for a total of 8 tea bags in each treatment.
  - Five treatments:
    - Agroforestry where Oust herbicide at the base of pawpaw trees, during tree establishment. (these bags will be buried near the base of the pawpaw trees; other bags will be buried on a transect, not near tree trunks).
    - Agroforestry where conventional chicken manure has been applied over a period of years.
    - Agroforestry where no chemicals have been used in 30 years.
    - Native forest with no crop history.
    - Conventional corn
- Burying Tea Bags
  - Tea bag set: Two nylon tea bags (one green tea, one red tea)
  - Buried 10 in. apart, 3-4 in. deep. Flagged for easy retrieval.
  - Tea bags should be buried on the same date (or nearly) for all treatments.
  - Burial date will follow the last soil disturbance; for this trial, burial date will be after planting in the corn field (only treatment site with soil disturbance).
  - Take photos!
- Tea bags will remain buried for 70 days.
- Tea bag retrieval: Place tea bag set (one red, one green) into Ziploc (or other receptacle) labeled with the appropriate Treatment Zone and Set Number (1-4). Ensure green and red tea bags can be differentiated.
- Dry tea bags. Keep them labeled!!
- Weigh tea bags and report data according to the provided excel workbook).



## Project Timeline:

March - April	May - Aug.	Sept. – Nov.
<ul style="list-style-type: none"> <li>• Edit/Approve Protocol</li> <li>• Complete MOU &amp; pre-survey</li> </ul>	<ul style="list-style-type: none"> <li>• Layout plots</li> <li>• After crop planting in corn field, bury tea bags in all treatments.</li> <li>• Take photos of all treatment sites.</li> <li>• After 70 days, retrieve tea bags. Collect in labeled Ziplocs by tea type and location (brush off excess soil).</li> <li>• Allow tea bags to dry for 2 day with Ziplocs open, out of direct sunlight. (or use dehydrator!) KEEP THEM PROPERLY LABELED!</li> <li>• Weigh dried tea bags; record weights in provided excel datasheet.</li> <li>• Email data to Liz for analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Take post-survey</li> </ul>

## References

- Keuskamp, J.A., Dingemans, B.J.J., Lehtinen, T., Sarneel, J.M., Hefting, M.M., 2013. Tea Bag Index: a novel approach to collect uniform decomposition data across ecosystems. *Methods in Ecology and Evolution* 4:1070–1075. doi:10.1111/2041-210X.12097
- McDaniel, M.D., Grandy, A.S., Tiemann, L.K., Weintraub, M.N., 2014. Crop rotation complexity regulates the decomposition of high and low quality residues. *Soil Biology & Biochemistry* 78:243–254. doi:http://dx.doi.org/10.1016/j.soilbio.2014.07.027

**Contact:** Liz Kolbe, Horticulture and Habitat Programs Manager, (515) 232-5661; [liz@practicalfarmers.org](mailto:liz@practicalfarmers.org)

*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.*