PRACTICAL FARMERS OF IOWA
COOPERATORS' PROGRAM Farmer-Led Research

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:

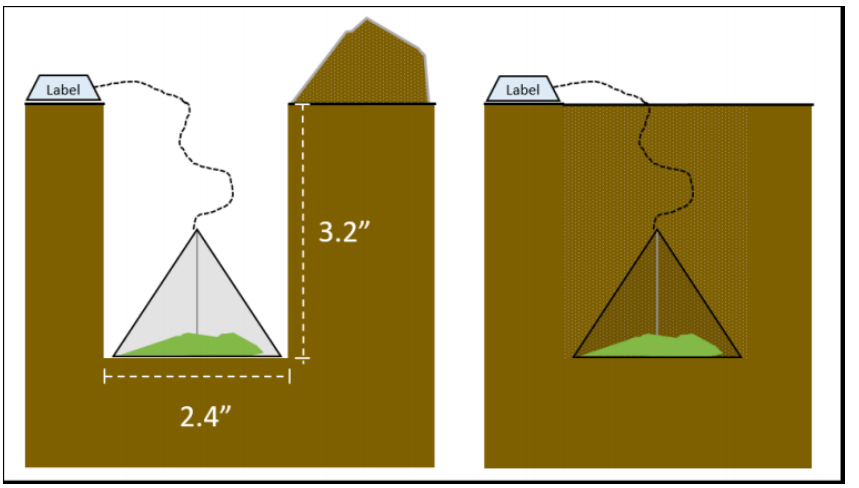
- Follow Research Protocols for study
- Take photos throughout the project
- Keep in contact with PFI with updates and questions
- Turn in all data by November 2019

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.
• Edit/Approve Protocol • Complete MOU & pre-survey	• Layout plots • After crop planting in corn field, bury tea bags in all treatments. • Take photos of all treatment sites. • After 70 days, retrieve tea bags. Collect in labeled Ziplocs by tea type and location (brush off excess soil). • Allow tea bags to dry for 2 day with Ziplocs open, out of direct sunlight. (or use dehydrator!) KEEP THEM PROPERLY LABELED! • Weigh dried tea bags; record weights in provided excel datasheet. • Email data to Liz for analysis	• Take post-survey

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

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