

EFAO 2022: Research Protocol

No-Till Organic Potato Trial

Farmer-researcher(s): Ken Laing, April Jones, Andre Houle, Kashava

Project type: Research trial

Research priorities: Cover crops, Soil health, Weed control

EFAO Contact: Sarah Larsen, sarah@efao.ca

Objective

To develop no-till and reduced tillage systems for organic potato production.

Background

In cooperation with the Living Lab-Ontario project, Ken Laing has been developing a no-till system for organic potato production using cover crops as mulch to eliminate the need for weed control and hilling.

References

- For more information on the development of Ken's system, please see: <https://efao.ca/living-lab-ontario-ken-laing-interim-summary-2020-2021/>
- For more information on Ken's other Living Lab - Ontario projects, please see: <https://efao.ca/living-lab-ontario-ken-laing/>
- For more information on the Living Lab- Ontario project as a whole, please see: <https://efao.ca/living-lab/>

Experimental Design

No-till treatment

The no-till treatment that Ken has developed includes a cover crop of rye and hairy vetch sown by September 1 in the year preceding the potato crop. The cover crop is grown throughout the fall, winter and proceeding spring. In the spring, potatoes are planted into the standing cover crop, and then the cover crop is flail mowed or rolled before potato emergence. Potatoes are then left to grow in the cover crop mulch without any tillage or hilling.

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Control

Tilled control of potatoes planted into tilled ground, and hilled throughout the growing season.

Design

- One sets of paired **treatment** and **control** plot, for a total of 2 plots or beds
- Plot size is flexible and depends on row spacing, and the row spacing is dependent on the planting machinery setup and harvesting machine - or if doing both by hand. (Remember that for no-till, spacing does not depend on row cultivation or hilling because you won't be doing these things!)
- However, note that do you want the **treatment and control to be the same spacing**
- **Your control is “business as usual” for your farm** - or how you have normally managed potatoes (hilling, etc.)

Other important considerations

- You will need to plan on how you will **terminate** the cover crop at first potato emergence -rolling or mowing -flail type mower works best to distribute residue evenly for good weed control.
 - Ben said he is currently trialing a tobacco stalk chopper to roller crimp stalks and so it has worked well. He says he will probably use that for termination.
- It is also very important to have **sufficient fertility** for potato crop applied before the cover crop is planted. See the linked references below.
 - [A&L Potato FactSheet](#)
 - [A&L Potato Nutrition 1](#)
 - [A&L Potato Nutrition 2](#)
 - **Step 1:** Get a basic soil test + micronutrients (e.g. S1B + S7 from A&L laboratories; Step 2: Analyze and amend if necessary
 - If you have questions about this, Ken has offered to answer questions.
- It is also critical to use **good quality cover crop seed** at a high rate to ensure a high amount of biomass of cover crop, and plant early enough for your area to allow good establishment in the fall.
 - Andre has rye cover crop seed he can sell the group
- If using rye/hairy vetch combination plant two weeks earlier than rye alone to let hairy vetch get established better.

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- Whatever machine or method you are using for planting, you **do not want bare soil left exposed in the spring after cover crop termination.**

Field Layout of Ken's

Below is the field layout for Ken's trial, given his specific system.

Statistical model

This trial will be a randomized and replicated trial over multiple farms. We will use an ANOVA (or other appropriate statistical methodology) to determine the significance of each measurement across the farmer participants.

Measurements

Crop Management & General Observations

Qualitative

- Record observations on: success of emergence, weed control, pest pressure, success of cover crop termination, visual signs of nutrient deficiency
- Time spent managing no-till treatment and control
- **Data sheets for recording to come**

Yield

Quantitative

- Farmers will harvest potatoes from **all plots separately**, and report total harvested weight and marketable weight (i.e. non-green or damaged potatoes). This will require a system like crates or other harvest bins to keep the harvest from each plot separated until the potatoes can be weighed, sorted and re-weighed.
- To the extent possible, farmers should harvest all plots on the same day or within a few days.
- **Data sheets for recording to come.**

Photos

Each farmer-researcher will take photos of:

- Plots before cover crop seeding

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- Cover crop establishment fall 2022 (multiple photos if possible)
- Cover crop growth in spring 2023 (multiple photos if possible)
- Plots at potato planting
- Plots at cover crop termination
- Potato growth throughout the 2023 season (multiple photos)
- Harvest and potato crop

Research Plan

Please note that if data is submitted after the submission deadline, EFAO staff cannot guarantee that your data will be analyzed and written up before the Research Symposium and/or the next growing season.

Time	Task	Methods & Measurements or Action Item
	Order cover crop seed	
	Prepare land	Ensure nutrient status is balanced ahead of cover crop establishment and potato production.
By September 1, 2022	Plant cover crop	
October 2022	Data submission	Submit management data and photos.
By December 31, 2022	Farmer-fee and research expense invoice with receipts for expenses	Submit invoices at this site: https://efao.ca/data/
	Order potato seed	EFAO staff?
	Plant potato crop	
	Terminate cover crop	
	Take photos	
	Other in-season management?	

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October 2023	Data submission	Submit management data and photos.
By December 31, 2023	Farmer-fee and research expense invoice with receipts for expenses	Submit invoices at this site: https://efao.ca/data/
January/February 2024	Finalize and publish research report	Work with EFAO staff to review polished research report for publication.

Staff check-ins

[Staff check-in here](#)

Materials

Please list all materials, supplies and equipment that will be reimbursed for this project. If possible, please also indicate a short-list of any in-kind materials, supplies and equipment that you will use.

Material	Unit	Quantity Required	Total Cost*	Note
Cover crop seed			EFAO will cover	
Potato seed			EFAO will cover	
Other equipment			In-kind from farmer	
Total				

Farmer-fee

EFAO will reimburse for cover crop and potato seed, and provide a stipend of \$250 in 2022 (after cover crop has been established and management data and photos are submitted) and \$250 in 2023 (after data and photos are submitted).

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Invoices for Farmer-Fees & Reimbursements

Research expenses

- Submit an **invoice along with copies of receipts** for all qualified expenses using form found at <https://efao.ca/data/>
- **Deadline:** December 31, 2022 for 2022 and December 31, 2023 for 2023.

Farmer-fee

- Submit an **invoice** for your farmer-fee using form found at <https://efao.ca/data/>
- **Deadline:** December 31, 2022 for 2022 and December 31, 2023 for 2023.

Memorandum of Understanding

Please fill out the MOU at <https://airtable.com/shrlAcZ7bowmTQwvd>

EFAO Account Information

As a farmer-researcher, you must maintain current membership with EFAO throughout the duration of your trial.

We use your mailing address to deliver cheques, farmer-led research signs and any trial supplies.

To check the status of your membership, log in here:

<https://efao.z2systems.com/np/clients/efao/login.jsp> or contact Martina, martina@efao.ca.

Farmer-fees and Reimbursements

I agree with the following:

- The deadline for reimbursements and farmer-fees is December 31, 2022.
- To receive reimbursement for qualified research expenses, I will submit an invoice and copies of receipts at the form found at <https://efao.ca/data/>.
- To receive my farmer-fee, I will submit an invoice to <https://efao.ca/data/> after I have submitted the final data and photos.

Photo Use

We like to share snippets and stories of farmer-led research through EFAO's print publication, e-newsletter and social media accounts, using photos and updates that you send us. We will credit you when we use any photos.

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Choices (Select all that apply on the MOU):

- EFAO has my permission to share photos in EFAO's print publications
- EFAO has my permission to share photos in EFAO's e-newsletters
- EFAO has my permission to share photos in EFAO's social media
- I do not want my photos share in these ways
- Other

Farmer-Led Research Agreement

I agree with the following:

- I will complete my trial to the best of my ability following the written protocol.
- If circumstances change and I am unable to conduct my trial, I will notify EFAO staff as soon as possible.
- I will keep in contact with EFAO staff with updates and questions, or to make changes to my protocol .
- I will submit data to the EFAO by the date specified in the written protocol.
- I acknowledge that if I submit data after the submission deadline outlined in the written protocol, EFAO staff cannot guarantee that my data will be analyzed and written up before the Research Symposium and/or the next growing season.
- I will work with EFAO staff to interpret data and write the research report.
- I will take photos of my project throughout the season(s).

Program Participation

There are several farmer-led research events held throughout the year including webinars, field days, and the Research Symposium. The Research Symposium is held in conjunction with the annual EFAO Conference at the end of November/early December.

When and where possible I will:

- Attend farmer-led research events, including webinars and field days
- Attend and present my research findings at the Research Symposium
- I will complete the feedback survey related to the program

Data Use

You own all data generated on your farm as part of your farmer-led research trial with EFAO. You can notify EFAO at any time to remove EFAO's privileges to use and share your data, photos and farm information. To opt out of sharing your data, please contact Sarah Larsen via email (sarah@efao.ca) or mobile (226-582-0626).

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I agree with the following:

- By participating in the EFAO's FLRP, I agree to share with the EFAO the data collected as part of my trial, along with photos of the project and any farm information (e.g. soil type, previous farm practices, and soil tests) that I deem relevant.
- By sharing my data, photos, and farm information with EFAO, I agree that EFAO can use this information in research reports, posters, and summaries of my trial (e.g. summaries on the EFAO blog and in EFAO's print publication).
- I understand that I can notify EFAO at any time to remove EFAO's privileges to use and share my data, photos, and farm information.

Signature

Please fill out the MOU at <https://airtable.com/shrlAcZ7bowmTQwvd>