

EFAO 2021: Research Protocol

Shallow vs deep tillage in permanent beds for onions

Farmer-researcher(s): Jeff Boesch, Cedar Down Farm - West

Project type: Research trial

Research priorities: Soil health

EFAO Contact: Sarah Hargreaves, sarah@efao.ca

Objective

To test whether permanent beds can grow onions well with shallow tillage (1.5 inches) only as compared to deep and shallow tillage.

Background

Systems for growing no-till vegetables often use a broadfork to loosen up the soil after winter and before planting. For this reason, Jeff has been wary of only doing really shallow seed bed-type tillage with no deeper tillage to loosen and warm the soil after the snowpack in spring. In 2021, however, conditions in Jeff's permanent beds are right to compare shallow and deep tillage, with little to no winter annual or perennial weed pressure in there and the cover crop radish tap roots did well.

Experimental Design

Jeff has 8 permanent beds that he will use to grow yellow storage onions in 2021. To prepare the beds, Jeff seeded the beds to tillage radish in August 2020. To test the difference between shallow + deep tillage and shallow tillage only, Jeff will follow the following randomized design design:

Field Layout

Pair	Pair 1		Pair 2		Pair 3		Pair 4	
Treatment	Shallow only	Shallow + Deep	Shallow only	Shallow + Deep	Shallow + Deep	Shallow only	Shallow only	Shallow + Deep
Variety	Yankee	Yankee	Yankee	Yankee	Norstar	Norstar	Norstar	Norstar

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Each bed is 200 ft long with 5 ft on centre of wheel paths. Onions are grown in clumps of 2 or 3 plants every 12 inches in 3 row beds with 13 inches between rows. There are approximately 1200 onion plants per bed. When Jeff prepares the beds in the spring, he will mark the ends of the bed with flags. During the growing season, he will cover all beds with insect netting for leek moth control.

Statistical model

Randomized complete block design with 4 pairs, analyzed using a one-way analysis of variance (ANOVA).

Measurements for each variety

Yield

Sample weight -- quantitative

- Jeff will harvest trial onions the day before his main harvest day.
- Before trial harvest, he will measure 100' into each bed and flag a 25' section to harvest as a test plot from each bed.
- He will harvest all onions from each 25' section into tared bushel bins, and weigh and record onions from each row separately.
- [Data Collection Sheet](#)

Weed pressure

Weeding time -- qualitative

- Jeff hoes and scuffles every 2 weeks for the first 8 weeks after transplant, and then spot hand weeds, if necessary.
- He will take photos and record notes on observations on weed pressure and weeding time among the beds.

Weed species -- qualitative

- Jeff will take photos and record notes on observations on weed species and annual vs perennial.

Disease and pest pressure

Observation -- qualitative

- Factors such as soil temperature differences between the treatments may result in differences in disease pressure.

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- Jeff will monitor the onions to see if there's any difference between the two treatments, especially for downy mildew pressure and leek moth.

Photos

Jeff will take photos of his plots throughout the season.

Research Plan

Time	Task	Methods & Measurements or Action Item
Last week of april or the first week of may	Till	According to experimental design
Last week of april or the first week of may	Plant onions	All beds the same
EARLY MAY	Install insect net	
Every 2 weeks for the first 8 weeks	Weed	Record observations
	Scout for pests and disease	Record observations
End of August	Harvest	See details above - harvest 25' sections and record weight from each bed separately.
October 1	Submit data and photos	Submit data and photos to Sarah
December 31	Invoice	Send Sarah invoice for farmer-fee

*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.

Staff check-ins

After planting and right before harvest.

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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
Pin flags			5 dollars	
Total			~5	

Farmer-fee

\$500 in 2021, invoiced to EFAO after farmer-researcher submits data.

Invoices for Farmer-Fees & Reimbursements

Research expenses

- Email an invoice along with copies of receipts for all qualified expenses to **research@efao.ca**.
- Expenses can be claimed anytime throughout the year.
- Deadline: December 31, 2021

Farmer-fee

- Email an invoice for your farmer-fee to **research@efao.ca**.
- Farmer-fees can be claimed after your data is submitted
- Deadline: December 31, 2021
- If you collect HST for your farm business, you can choose to add HST to your fee.

Memorandum of Understanding

You agree to keep an active membership with EFAO throughout the duration of your trial.

<https://form.jotform.com/210625202854246>

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.