

**FARMER-RESEARCHERS**

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Field Good Farms/ Ferme j'me champ bien is located on the traditional territories of the Anishinaabeg.



**RESEARCH REPORT 2021**

**No-till broccoli with landscape fabric in northern Ontario**

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**IN A NUTSHELL**

As a continuation of their no-till broccoli trial in 2020 using cover crops, Ryan and Isabelle tested no-till broccoli using landscape fabric in 2021.

- Broccoli grown using the no-till treatment of landscape fabric had lower yield and required more labour.

- Despite poor performance of no-till broccoli using mulches, Ryan and Isabelle still believe that fall broccoli in northeastern Ontario can be grown successfully in a no-till system, and will likely try no-till broccoli without a mulch system (cover crop or fabric) in 2022.

This trial was funded by FedNor and through the Living Lab-Ontario project to help support knowledge transfer of innovative practices. Funded by Agriculture and Agri-Food Canada (AAFC), this initiative has farmers and federal scientists from AAFC and Environment and Climate Change Canada studying soil health and water quality on real farms.



Farmer-researcher Ryan in broccoli at harvest.

**MOTIVATION**

Ryan and Isabelle are working to reduce soil tillage wherever possible. Towards this goal, in 2020, they experimented with planting no-till fall broccoli into a crimped cover crop. However, the 2020 trial results found that broccoli yield was too low for the method to be viable (1). To continue to explore this question, they wanted to try a different approach to no-till broccoli using landscape fabric.

**METHODS**

Prior to 2021, Ryan and Isabelle tilled the garden space used for this trial. In fall 2020, they applied horse manure compost, made

some passes with the disc harrow, and seeded winter rye as a cover crop. However, the cover crop didn't establish well in all areas. To control the rye in the spring of 2021 they put the landscape fabric in place for the treatment plots and tilled the control plots.

The field layout for the trial was planned at four, one hundred foot beds, divided in half, with each half bed randomly assigned to no-till treatment (T) or control (C). However, due to poor transplant germination, Ryan and Isabelle shortened the beds to 61.5 feet, divided them in

half, and utilized all good quality transplants available (Photo 1).

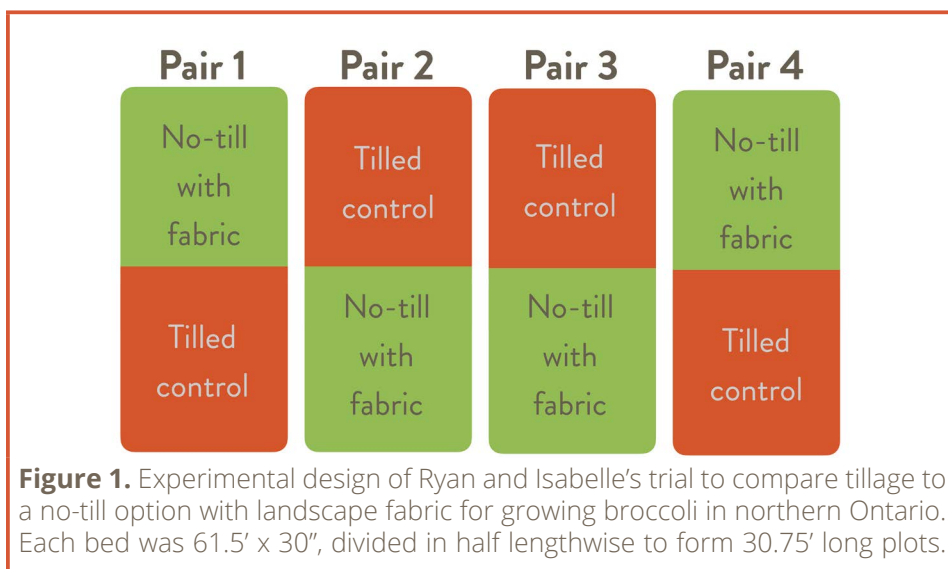
For each replicate section, they tracked labour required for each treatment (bed preparation, transplanting, weeding, harvesting, fertilizing) and measured total weight and number of heads. Ryan and Isabelle placed HOBO Pendant® MX Water Temperature Data Loggers w/Bluetooth 5 cm below the soil surface in one of the treatment and one of the control plots (Photo 2).



**Photo 1.** Transplanting broccoli in tilled plots and plots with landscape fabric for no-till management.



**Photo 2.** HOBO Pendant® MX Water Temperature Data Loggers before being buried 5 cm below the soil surface in a tilled control plot and a no-till treatment plot with landscape fabric.



**Figure 1.** Experimental design of Ryan and Isabelle’s trial to compare tillage to a no-till option with landscape fabric for growing broccoli in northern Ontario. Each bed was 61.5’ x 30”, divided in half lengthwise to form 30.75’ long plots.

### DATA ANALYSIS

To evaluate the effect of treatment on yield and labour, we used a t-test to compute the least significant difference (LSD) at the 95% confidence level.

A difference between yields or labour minutes greater than or equal to the LSD indicates the difference is statistically significant, meaning Ryan and Isabelle can expect the same results to occur 95 out of 100 times under the same conditions. A difference that is less than the LSD indicates the difference in yields is not statistically significant, or not

reliably different. We could make these statistical calculations because Ryan and Isabelle’s experimental design involved replication of the treatments (**Figure 1**).

### FINDINGS

#### Yield

From one week’s harvest, the control plots had significantly greater broccoli yield than the no-till plots with landscape fabric, both in terms of total weight (lbs) and number of marketable heads. Ryan and Isabelle needed to see a difference greater than 2.23 lbs and 2.73 heads for

yield based on weight and number of heads, respectively. Total yield in the control plots averaged 22.2 lbs greater (+176%) than the no-till plots and the control plots had an average of 10.5 more heads (+160%) (**Table 1**).

#### Labour

Total labour was greater in the no-till plots compared to the control plots by a total of 12 minutes per plot, with an LSD of less than a minute. This was mostly due to labour associated with bed preparation and weeding. Weeding time alone, however, was lower in the no-till plots by an average of 11.5 min per plot, with an LSD of 8.5 minutes (**Photos 3 & 4**).

#### Soil Temperature

It appears that the landscape fabric moderated the soil temperature, as soil temperature was more variable in the tilled control plots. This means the landscape fabric may have kept the broccoli a bit cooler than is ideal.

**Table 1.** Yield and labour results for broccoli grown using tillage and landscape fabric.

	YIELD (LBS)	YIELD (# OF HEADS)	TOTAL LABOUR (HRS.)	BED PREP (MIN.)	TRANS-PLANT (MIN.)	WEEDING (MIN.)	HARVEST (MIN.)	FERTILIZE (MIN.)
Control	51.3	27.8	1.5	14.8	31.2	19.2	13.2	11.2
Landscape Fabric	29.1	17.2	1.7	27.2	41.2	7.7	12.7	11.2
P-value	0.04	0.05	0.03	**	0.005	0.004	NS*	NS*
Observed difference (Control - Treatment)	22.2	10.6	0.2	-12.4	10.0	11.5	0.5	0
LSD	2.2	2.7	0.01	**	5.7	8.5	*	*

\*NS = not significant \*\* = Data collected at a trial level (i.e. not at a plot level) so we were unable to run statistics.

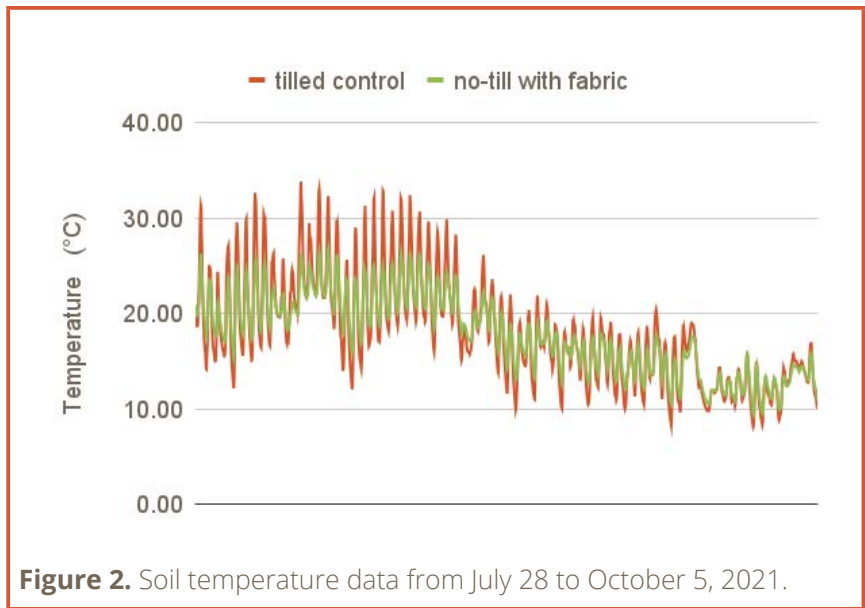
**CAVEATS**

This trial was performed in garden plots that had never been in no-till production.

Despite using insect netting (25g Protek Net), there was significant damage from the swede midge that they observed affected the broccoli grown on landscape fabric more than the control broccoli. The treatment and control plots were not netted separately.

**NEXT STEPS**

Having tried two different no-till methods for broccoli using different mulches without success, they will likely try no-till broccoli without a mulch in 2022. Additionally, they will do their next trial in garden plots that have been in no-till production for at least two years.



**Figure 2.** Soil temperature data from July 28 to October 5, 2021.



**Photo 3.** An example of weed pressure in tilled plots.



**Photo 4.** An example of weed pressure in no-till plots with landscape fabric.

**TAKE HOME MESSAGE**

“We will not switch our fall broccoli production system to no-till using landscape fabric,” says Ryan, “however, we still believe that fall broccoli in northeastern Ontario can be grown successfully in a no-till system.”

**REFERENCES**

1. Spence, R and Spence-Legault, I. 2020. No-till fall broccoli in northern Ontario, <https://efao.ca/wp-content/uploads/EFAO-Spence-Legault-2020-final.pdf>.