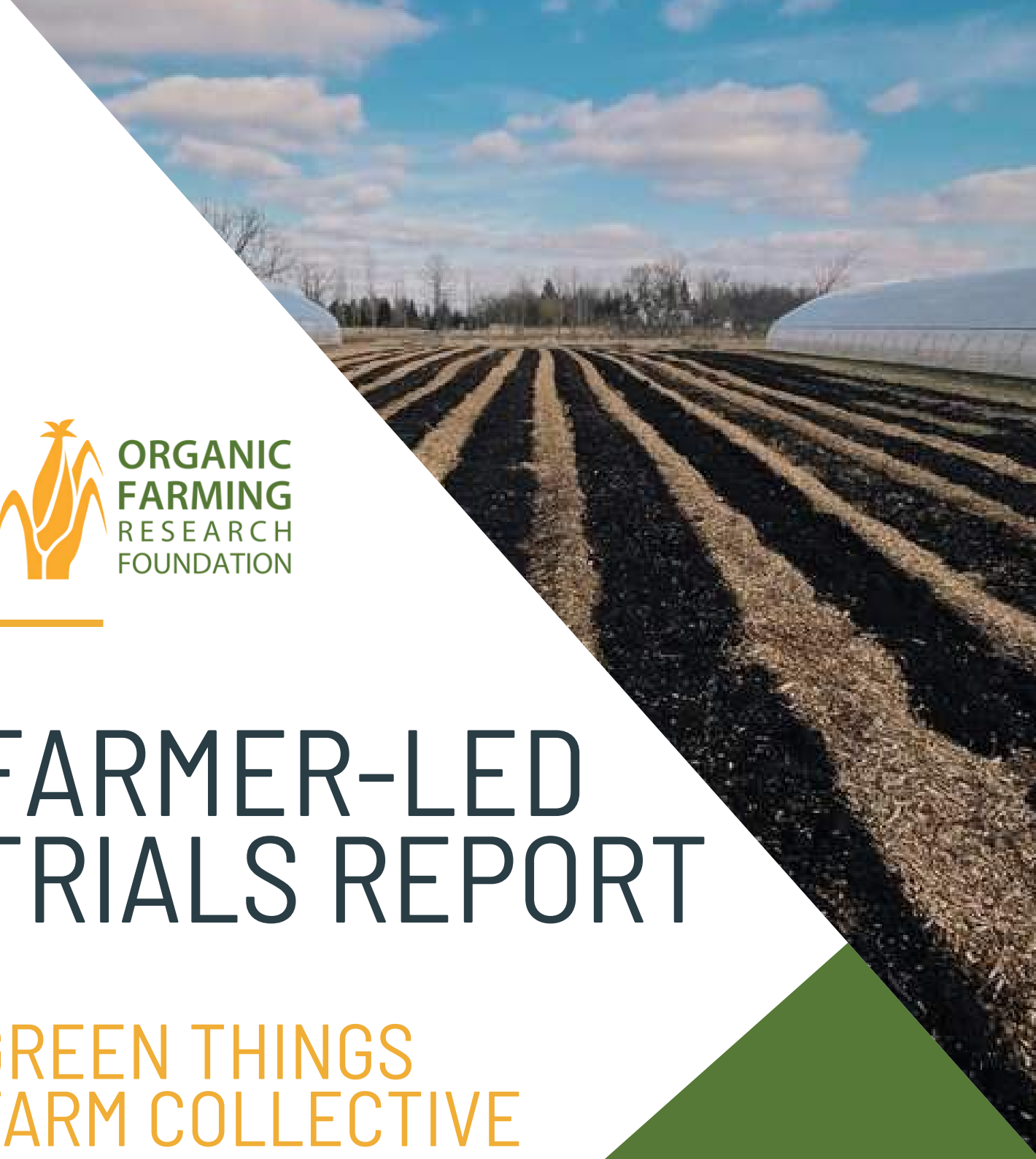

ORGANIC FARMING RESEARCH FOUNDATION

FARMER-LED TRIALS REPORT

GREEN THINGS FARM COLLECTIVE

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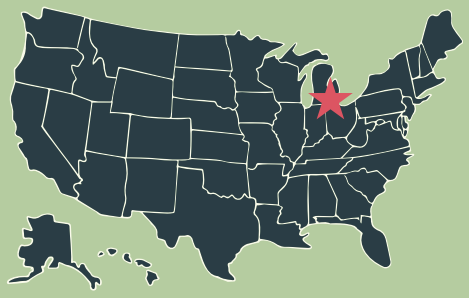
Farmer-Led Trials: In-row seed spacing & root crop yield

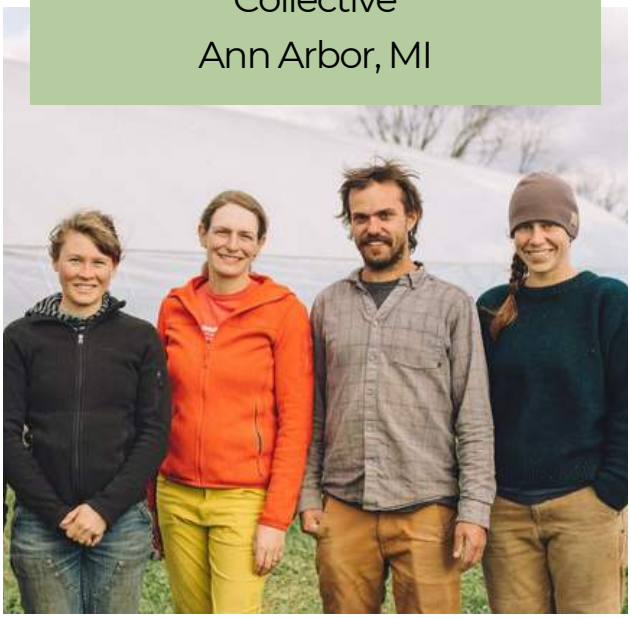


2024

Farmer-Researcher:
Nathan Lada
Green Things Farm Collective
Ann Arbor, MI

ABOUT THE FARM

Green Things Farm Collective is a diversified vegetable farm located in Ann Arbor, Michigan. The collaboration of farmers that make up The Collective produce an array of fresh market vegetables and cut flowers for CSA memberships, farmers markets, small grocery and small wholesale markets. The bulk of the production takes place from early April to October in 5 acres of a permanent no-till/low-till, deep mulch bed system. The farmers also raise beef cattle and manage 40 acres of woods.



Green Things Farm Collective farmers, left to right: Hannah Weber, Jill Lada, Nathan Lada, Michelle Brosius.

IN A NUTSHELL

Green Things Farm Collective wanted to understand what impact row spacing of direct-seeded crops had on marketable crop yields. The trial compared 5 and 6 row plantings of 'French Breakfast' radishes, 5 and 6 row plantings of 'Rover' radishes, and 3 and 4 row plantings of 'Early Wonder' beets. The results showed that radish yield was greater at a 5 row spacing (vs 6 row) , while in beets, the number of rows per bed (3 vs. 4) did not have an effect on marketable beet yield. There was, however, a high degree of variability within marketable yield among plots, and further investigation is recommended.

WHAT WAS THE ON FARM TRIAL ABOUT?

Nate and his fellow farmers are always interested in how they can maximize their harvest in the space they have available. Their interest is to grow more quality, without having to expand the amount of space they cultivate. This trial was born from their inherent curiosity and desire to understand the best spacing scenarios for some of their staple crops.

Green Things Farm Collective radish spacing trial plots during harvest.

"I think it is important that farms can conduct their own trials and research in a practical way to figure out what will work best under their cultivation systems."

-Nathan Lada, farmer-researcher

HOW WAS THE TRIAL DONE?

The Collective set out to answer the question: What impact does row spacing of direct seeded crops have on marketable crop yield?

The trial compared 5 row and 6 row plantings of 'French Breakfast' radishes, 5 row and 6 row planting of 'Rover' radishes, and 3 row and 4 row planting of 'Early Wonder' beets. The planting density remained constant within each row, while the number of rows per bed changed. The marketable yield (i.e. yield that was selected for market) was weighed and recorded for each planting. The plantings were planned as a part of the farm field plan, and were located throughout the farm. The initial plantings began in early April, with final harvest dates in early July.

The locations of the beets and radishes were made as a collective based on the farm crop

Aerial view of the farm, identifying fields used.

rotation plan. The trial did not alter the farm's planting plan or schedule. It was important to the farmers that they only planted what would be viable for their plan and for their potential sales. While this was helpful to maintain regular farm production, it did provide a challenge for using the areas for statistical analysis.

Root crops were harvested according to a planned harvest window, which related to the anticipated time to harvest after seeding

based on experience. Radishes and beets were harvested by pulling the crops out of the ground by hand. Marketable roots were then put into rubber banded bunches by weight. After an initial weight and bunch count, bunches were then washed using spray hoses to remove dirt and debris to make them marketable, packed into plastic totes, and then weighed again to get a marketable yield weight. Percent loss was calculated as the percent difference between harvested and marketable yield.

FINDINGS

For beets, the number of rows per bed (3 vs. 4) did not have an effect on marketable beet yield, percent loss, or number of bunches harvested.

Yields were slightly higher in the plots where beets were grown at a density of 4 rows per bed, but more investigation is needed to confirm this as there were only two replications of beets planted. Also, because beets were harvested multiple times in a treatment area, unharvested beets were given some extra time to size up which was likely a factor in the increased yield.

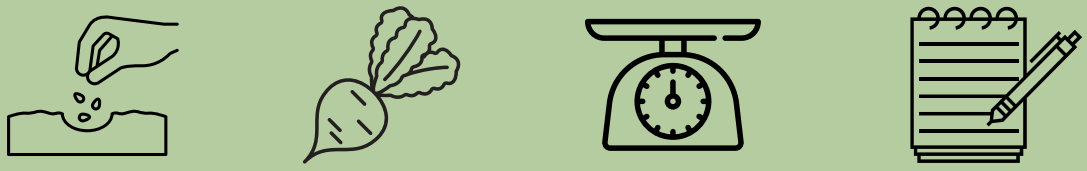
'Early Wonder' tall top beets, photo courtesy of High Mowing Seeds.

Table 1. Beet yields, percent loss, and total bunches for 3 and 4 row plantings.

Treatment	Initial Yield per bed (lb)	Marketable Yield per bed (lb)	Percent Loss (%)	Total Bunches
3 row	389a	300a	23a	145a
4 row	427a	327a	23a	146a

**Within columns, values followed by the same letter are not significantly different at P<0.05*

STEPS OF THIS TRIAL



Crops were planted in successions with initial planting in April and final harvest in July.

"My guess is that in-row plant density may be more important that between row density for radishes and beets. ***I'd like to focus on this in my next on-farm trial.***"

- Nathan Lada, farmer-researcher

For radishes planted at 5 and 6 rows per bed, data for each variety were analyzed using paired t-test comparisons (Student's t). Average marketable yield was slightly lower in the 6 rows per bed plots, but number of rows per bed did not have a significant effect on yield (Table 2).

While the 6 row treatment was easier to seed (2 passes with a 3 row seeder vs 5 passes with a single row seeder), harvesters were taking more time to sort through more radish rows for roughly the same number of bunches as the 5 row treatment.

Table 2. Radish yields, percent loss, and total bunches for 5 and 6 row plantings.

	Initial Yield per bed (lb)	Marketable Yield per bed (lb)	Percent Loss (%)	Total Bunches
French Breakfast				
5 row	193	151	23	200
6 row	188	144	23	156
	ns	*ns*	*ns*	*ns*
Rover				
5 row	261	205	22	259
6 row	241	189	23	233
	ns	*ns*	*ns*	*ns*

**Within varieties and columns, values followed by the same letter are not significantly different at P<0.05*

Radish harvest at Green Things Farm Collective.

TAKE HOME MESSAGES

Nate and his colleagues' hopes for the trial were to figure out minor tweaks to increase yields in radish and beet production. Given that these crops are planted weekly throughout the growing season they were looking to see a side by side comparison of two different row treatments in the two crops over time that would show them if there was a more productive row configuration.

The data collected showed no statistical difference in yield between either the radish or the beet trials. One limitation was that there were no replications of the treatments from week to week. Since harvests varied so much from week to week (likely due to weather conditions on fast growing crops), it was hard to determine what was or was not having an influence on marketable yields in terms of row density vs other factors without having replications to compare within each planting.

In the future they would like to explore a similar process of adjusting planting population in crops on the farm to increase overall marketable yields in direct seeded crops. This would not only adjust row counts, but also adjust in-row seeding density to compare different populations. The farmers' suspicion is that in-row density is just as important as overall row density for marketable yields, and without adjusting both it will be hard to determine the best configuration for growing these crops in a permanent bed system. In future trials, they would also focus on fewer plantings and more replications to create a better data set.

ACKNOWLEDGEMENTS

This report is made possible by OFRF's Farmer-Led Trials program. In this program, farmers receive technical support to address their challenges through structured on-farm trials. To learn more about OFRF Farmer-Led Trials Program, visit our website page at https://ofrf.org/research/farmer-led-research-trials/

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Farmer-Led Trials Program Spotlight: Green Things Farm Collective

Written by Jose Perez, OFRF's Research & Education Engagement Coordinator

Nathan Lada is one of the four co-owners of Green Things Farm Collective, a diversified vegetable farm located in Ann Arbor, Michigan. The farmers produce an array of fresh market vegetables and cut flowers for CSA memberships, farmers' markets, small grocery and small wholesale markets. The bulk of the production takes place in five acres of permanent no till/low till, deep mulch bed system from early April to October. The farmers also raise beef cattle and manage 40 acres of woods.

Nathan and his wife Jill started farming in this farm location in 2011, but the farm became what it is now when a longtime employee and two other independent farmers joined them in 2020. Since then, they have managed the farm as a single-unit LLC. The farm has been certified organic under the USDA since 2015, and has been Real Organic Project certified since 2020.

At right: Collective Farmers in 2020: Eric Kampe (left the farm in 2022), Hannah Weber, Jill Lada, Nate Lada, Michelle Brosius.

Figuring out plant spacing and densities

"Our primary focus is producing high-yielding species and varieties with lots of hand labor," said Nathan. The farm operation employs between 15 to 20 people in the main season with the goal of maximizing production. "It's hard to find information from other growers about their trials on spacing and plant densities, especially for high organic matter, high fertility, and fast turnover bed systems," continued Nathan. When he heard about OFRF's Farmer-Led Trial program from one of his employees, it immediately piqued his interest.

While the farm has done some limited experiments, they do not have comprehensive data to help them determine which row spacings are best for their production practices. Nathan and his colleagues hope that maximizing yield per bed will help the farm increase production without needing to develop new growing spaces. Nathan is excited to see the results and share the outcome of this trial with other growers looking for similar information.

"I think it is important that farms can conduct their own trials and research in a practical way to figure out what will work best under their cultivation systems. Our opportunity to work with OFRF will not only inform us about specific densities to improve production on our farm, but will also hopefully inform a repeatable pathway for us and others to make small improvements to our production based on practical farm-based trials that are simple and bring value to the farm." – Nathan Lada

Farm trial plan

Beets and radishes are the focus of the farm trial because they are among the most produced crops at the farm, being planted in succession every week or every other week during the season. Although the farm already collects yield and some crop quality data per bed, conducting the on-farm trial with OFRF will provide the direct technical support to be more methodical and comprehensive in designing the farm trial, conducting data collection, and drawing trustworthy results.

Preliminary farm trial plans include comparing two crop configurations for one beet variety and two crop configurations for two varieties of radishes for yield and crop marketability. Potential measurements identified include overall yield (bunches per bed, pounds per bed), losses due to undersized or oversized crops, losses to disease, days to maturity, and crop quality.

The farmers have participated in on-farm research in the past, but felt that those trials did not reflect farm working conditions. One goal Nathan expressed was to integrate the trial into their existing production plan, so OFRF is working with Nathan and his team to design an on-farm trial that is both useful and practical for the farm without disrupting their seasonal production. At OFRF, we are excited to be a part of Green Things Farm Collective's journey, and hope that their work will inspire more farmers to conduct research trials on their farms.

Contact Us

www.OFRF.org

office@ofrf.org

831-426-6606

Learn more about OFRF's
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