EFAO
ECOLOGICAL FARMERS ASSOCIATION OF ONTARIO

Planting methods for easyleaf type lettuce

2023

FARMER-RESEARCHER
Jeremy Stojan and Rebecca Martinez, Fresh City Farms

FUNDING
Brian and Joannah Lawson Family Foundation

Robert and Moira Sansom Ideas Foundation, a fund within the London Community Foundation

IN A NUTSHELL

To optimize labour associated with planting of easyleaf lettuce, farmers at Fresh City Farms compared transplanting, direct seeding and a step-in method.

- Among four succession plantings, there was a lot of variability and we were unable to discern clear differences between the three planting methods.
- Trends and observations support that transplanting has the potential to be highest yielding; and, depending on soil conditions, the step-in method may reduce labour time.
- The process of conducting a trial on the farm highlighted other areas for optimization, such as bed preparation, which ultimately led to greater yields in 2024.

MOTIVATION

Fresh City Farms is a for-profit organic grocery business that started out 12 years ago as an urban farm CSA. Over the years, the grocery delivery side of the business has grown vastly, but the farm has stayed relatively small. In 2022, the farm moved to a new location in North York and is now a 1.5 acre organic urban market garden. They focus on higher value bunching greens and cut salad mix, while also growing a variety of vegetables for the on-site stand.

With a focus on salad, Fresh City Farms grows a lot of Salanova® and other easyleaf–type loose leaf lettuce, with 10-11 successions of 4 x 100 ft beds each year. Easyleaf is a type of loose-leaf lettuce that is bred for its ease of slicing and preparation.

At current spacing, this results in 3000 transplants every two weeks for lettuce alone, which requires a great deal of labour. In 2022, Jeremy observed that discarded transplants rooted on their own, leading him to get curious about other potentially easier methods for planting.

METHODS

To reduce the labour associated with transplanting, Fresh City Farms compared three methods of growing Salanova and easyleaf:

1. Transplanting (standard method)
2. Direct seeding using a Jang push-seeder
3. Step-in method, where transplants are rolled over with an Earthway push-seeder to squish their roots to the ground

EXPERIMENTAL DESIGN

FIELD LAYOUT

For the first four succession plantings, Fresh City Farms set up their comparison with two replicate sections per treatment in each succession, with 4 x 25′ beds for each method in **Table 1**.

Table 1. Experimental design at Fresh City Farms for each of four succesions. DS = direct seeded; TP = transplanted; SI = step-in transplanted; N/A is transplanted lettuce that will not be included in the trial.

1		2		3		4	
Bed 1	**Bed 2**	**Bed 3**	**Bed 4**	**Bed 5**	**Bed 6**	**Bed 7**	**Bed 8**
4x25′ SI	4x25′ TP	N/A	4x25′ DS	4x25′ SI	N/A	4x25′ TP	4x25′ DS
4x25′ DS	N/A	4x25′ TP	4x25′ SI	4x25′ DS	4x25′ TP	N/A	4x25′ SI
4x25′ SI	4x25′ TP	N/A	4x25′ DS	4x25′ SI	N/A	4x25′ TP	4x25′ DS
4x25′ DS	N/A	4x25′ TP	4x25′ SI	4x25′ DS	4x25′ TP	N/A	4x25′ SI

They planted 13 varieties:

- Intercut
- Rhone
- Ezflor
- Ilema
- Ezpark
- Hampton
- Burgundy
- Green incised Salanova®
- Red incised Salanova®
- Green sweet crisp Salanova®
- Red sweet crisp Salanova®
- Green oakleaf Salanova®
- Red butter Salanova®

MANAGEMENT

For all beds in this trial, Fresh City Farms:

- Mixed the 15 lettuce varieties throughout the beds;
- Managed the beds in the same way, using no-till methods including laying silage tarps to clear beds;
- Added compost and other fertility at the same rate for all beds and treatments, which included 1.5 wheelbarrows compost, 12.5lbs Acti-sol chicken manure/ 50ft bed;
- Added compost before transplanting, after direct seeding and stepping-in;
- Recorded the number of transplants and seed used for each treatment;
- Clear-cut beds at harvest and recorded yield and days to maturity (DTM) for each treatment;
- Recorded employee time taken for each method, including seeding transplants, direct seeding beds, transplanting, compost/amendment application, filling in gaps with transplants, weeding, harvesting.

Lettuce growing using the transplant method at Fresh City Farms in 2023.

DATA ANALYSIS

To evaluate the effect of each planting method on yield and labour time, we used a statistical model called analysis of variance (ANOVA) with a 95% confidence level to calculate the least significant difference (LSD) needed to call the treatments "statistically different".

Using a 95% confidence level means that if we measure a difference between any two treatments that is greater than the calculated LSD, we expect this difference would occur 95 times out of 100 under the same conditions. In this case, we consider the difference reliable and refer to the results as statistically significant. On the other hand, if we had measured a difference between any two treatments that was less than the calculated LSD, we would consider these treatments unreliably different or statistically similar. We can make these statistical calculations because Fresh City Farm's experimental design involved replication of the treatments.

Lettuce growing using the transplant method at Fresh City Farms in 2023.

FINDINGS

YIELD

There was lots of variability in yield across harvest dates, so we were unable to tease apart clear differences in yield among planting methods, both in terms of lbs per foot (P=0.88) and cumulative yield per foot (P=0.38).

From the trends and the staff team's impressions, transplanting may be the highest yield method, but we need more data to confirm. Direct seeding was tricky and slow, and never seemed optimal during the trial.

To evaluate direct seeding further, Jeremy tried it again after the trial. He was able to get a good stand of lettuce that yielded similar to other methods. However, he wouldn't do it again because the density of the leaves made it difficult to differentiate high from low quality leaves during harvest. This extra effort negated the advantage of using one-cut leaf lettuces like this.

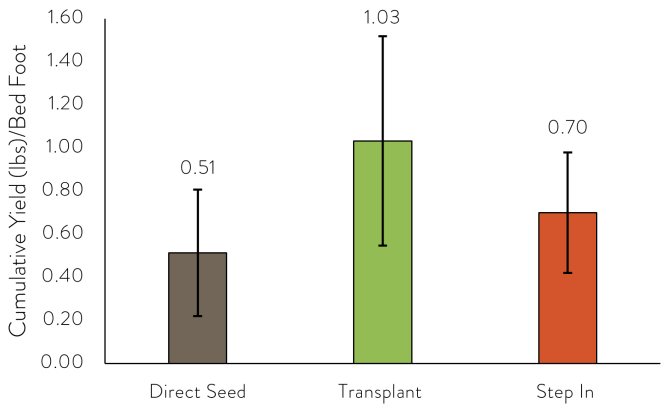

Figure 1. Yield per bed foot for the different methods used.

LABOUR TIME

Due to the wide variability in labour time, we were unable to tease apart clear differences among planting methods (P=0.94).

The team felt like the step-in method was more efficient during planting, because instead of transplanting with multiple people, one or two people can lay the cells on the beds and cover them with compost. Depending on how soft the soil is in the area, however, it is possible that transplanting could be just as fast as the step-in method.

LABOUR TIME OVER THE SEASON

During the trial, the team was curious to know whether transplant time got more efficient over the season. There was not enough data to say conclusively, but averages indicate it did, which helps direct training efforts in the future.

Table 2. Labour efficiency in hours for transplanting over the season for Jeremy (manager) and all other staff averaged.

DATE	HOURS SPENT	TEAM MEMBER
May 12	1.17	Jeremy
May 17	2.41	Staff
June 7	1.48	Staff
July 11	1.34	Staff

2024 MID SEASON UPDATE

After focusing on better bed preparation and management, as well as labour retention, lettuce plantings at Fresh City Farms in 2024 changed dramatically. The average yield in 2023 was 89.8 lbs per 100 ft bed from the trial (the two failed trial beds that yielded 0 were removed from this average), with a range of 10 lbs per 100 ft bed to 217 lbs per 100ft.

In 2024, the average for the first two plantings was 154.3 lbs per 100 ft bed, and was consistent across beds. Jeremy thinks this is due mostly to better bed preparation, including weeding well first, broadforking, adding more fertility, and watering regularly.

Another big factor this year is that they downsized the lettuce plantings to two beds every two weeks and, therefore, have more time to manage them properly. With this change, they are producing the same amount of lettuce from half the amount of beds compared to last year!

Over time the beds have been improving as they add more compost, broadfork, and smother weed populations with tarps. The soil structure has changed from hard clay, to soft, cake-like soil in a lot of the field.

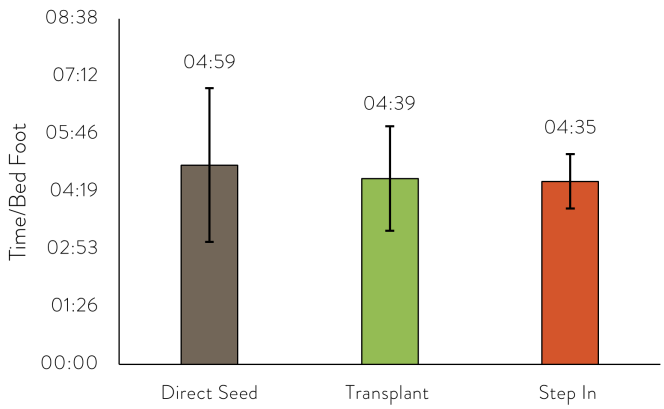

Figure 2. Labour time spent per bed foot for the different methods used.

CONTEXT AND CAVEATS

In terms of days to maturity (DTM), Fresh City Farms harvested lettuce on specific days during the week for shipment to the warehouse. So while the growth progress was monitored regularly, the DTM was ultimately dependent on the day they had to harvest the bed which could slightly affect the DTM across all treatments.

NEXT STEPS

For Jeremy, the takeaway from this trial is that the labour to transplant was the wrong focus for optimizing lettuce production at Fresh City Farms. He now realizes that staff were stretched too thin, and were not giving the crop the preparation and care it needed. When the crew is able to give the crop more time, yields responded very well —- enough to compensate for the extra labour.

Although the data in this trial is fairly inconclusive, the real world takeaways for Fresh City Farms have been invaluable!

TAKE HOME MESSAGE

There were no clear differences among the planting methods tested, due to wide variability among the treatments. Nonetheless, the process of conducting the trial highlighted areas for optimization for more efficient farm operations. Moving forward, Fresh City Farms will:

- Focus more on training and employee retention from season to season in terms of labour, vs. changing planting methods.
- Focus on better preparing beds by broadforking between crops, adding plenty of fertility and watering appropriately.

Working together on this project allowed the farm to foster support and encouragement from the farm team, their volunteers and customers around their dedication to their goals and future farm plans.

ACKNOWLEDGEMENTS

Thank you to everyone who participated in the trial, including Najat Ali, Destyne Clause-Roe, Cynthia Goldrup, Rico Hua, and Treasure Lyons. Thank you also to Rebecca Martinez and Sarah Larsen for helping compile and analyze the data, and for creating the final report.