

RESEARCH PROTOCOL: SEED PRODUCTION & BREEDING 2018

Lettuce Seed Production in Northern Ontario

Farmer-researcher

Peggy Baillie, Three Forks Farm

This document outlines the steps that Peggy will follow to execute her research project, *Lettuce Seed Production in northern Ontario*, including design, execution, data collection and data sharing. It also serves as a Memorandum of Understanding between Peggy and EFAO.

Experimental Design

Peggy will compare two methods of lettuce seed production:

1. Covered structure
2. Uncovered

In the covered structure, Peggy will plant 5 test plots of lettuce, each plot with a different variety. Outside of the tunnel, 5 plots of the same crops will be planted without cover under natural conditions. There will be a total of three 3' by 70' beds in production, with 48' of the three beds under cover. In this way, the design is a **paired design with 5 replicates**.

With the weight of seed produced in each plot as well as germination rates, we will be able to run statistics to calculate the probability that growing seed inside the structure is better or worse than no structure. We will not be able to determine if specific varieties are better or worse since this design does not have replicate plots of each variety. Further, if varieties differ a lot in their response to the covered structure, we may not have the statistical power to detect any changes. All this said, we hypothesize that the covered structure will either improve seed production for all or none.

The start of the research would begin in April with construction of the covered structure. The construction of the structure is estimated to take 2 days for 2 people. Peggy will plant test crops in the greenhouse at the beginning of May, to be transplanted out June 10th (approx). She will monitor the crops and collect data throughout the season. At the end of their growing season, Peggy will harvest, clean, sort and weigh the seed. Finally, she will conduct a final germination test of each crop.

One challenge will be to control humidity in the covered structure without the use of fans or power. For this reason the length of the structure will be positioned east to west with the ends open on each end, to allow the prevailing winds to mitigate the humidity. This will also be supported by roll up sides.

The other main challenge will be if it is another wet and cold year; if so, the likelihood of success is unknown. Peggy is unsure if using the covered structure will greatly improve the viability of the seed under those conditions or not, but these factors are beyond her control.

Because of the cost, only one structure will be built. This is technically pseudoreplication but given the uniformity of the soil under the treatment and control areas, Peggy feels confident in the data.

Predictions

Peggy expects that the weight and viability of the seed produced in the covered structure will be higher than the control group, and that the rate of return on the cost of the structure will be achievable within 2 years from seed sales.

General management

- The structure will be constructed in late April, once the soil is able to be worked. This date will be noted for future reference. All crops will be started early in the greenhouse under the same conditions on the same day for both the covered and outside plots. Seedling from the greenhouse will be **randomly selected** for either under cover or outside.
- Once the structure is constructed, and the last frost date has passed, both the covered and outside crops will be planted on the same day.
- Moving forward, the crops will be monitored on daily basis. Peggy will note any observations on the recording log, organized by crop variety.
- Using the Accurite temperature sensors, daily temperatures will be recorded and monitored. If temperature becomes too high inside the structure, Peggy will modify and record any changes. Peggy will also note the precision of the sensor, and err on the side of caution if the temperature starts to approach a lethal heat.
- Peggy will record first dates for bolting, seed set, seed harvest, volume of seed harvested and germination rates.

Planting Layouts: Green cells are lettuce varieties, separated by flowers and peppers to maintain minimum isolation distances for seed production.

Covered Structure

Green Leaf	Cosmos	Green Romaine	Strawflower	Green Curly
PEPPERS				
Celosia	Red Lettuce	Snap Dragons	Freckled	Stock

Uncovered (Control)

Green Romaine	Cosmos	Green Curly	Strawflower	Red Lettuce
PEPPERS				

Celosia	Green Leaf	Snap Dragons	Freckled	Stock
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Measurements

Peggy will take high quality photos throughout the process, from building the structure to harvesting and weighing seed, and germination tests.

Peggy will record the following dates (see **Data Collection Sheet**, if useful):

- Planting dates
- Bolting dates
- Seed set dates
- Seed harvest dates

Peggy will also record the following data:

- Temperature (in covered and outside: peak temps only)
- Precipitation/ watering; there’s an Environment Canada weather station about 22 km away from the farm with precipitation data available hourly or daily
- Seed volume (uncured seed, lightest seed removed?)
- Germination rates of seed

Upon collection of all the data, Peggy will enter the data in the **Data Entry Form** and **Temp/Precip Log**.

Details

The key detail to make sure that the right data is tracked at the right time. For this reason we will be keeping the data tracking sheets in the greenhouse which will be directly beside the covered structure so that it is accessible at all time to record data as we work on the farm.

Statistical test

Paired t-test of control vs treatment for the different measurements. In this way, we can determine if lettuce seed production varies between under the structure and without structure, but not whether different varieties vary.

Materials and Research Expense Budget. Prices are approximate; NA or in-kind for any materials that you already own or have access to. Please indicate if you intend to give any of the supplies to EFAO’s Tool Library for others to use after you are finished with them.

Material	Quantity	Unit	Total Cost	EFAO’s Tool Library (Y/N)
T- Posts - 6 ft	48	\$8	\$384	N
PVC Elbow - 45	12	\$1.85	\$22.2	N

Degree				
PVC Elbow - 90 Degree	24	\$1.85	\$44.4	N
PVC Pipe - 1.5"x 10'	30	\$12	\$360	N
Greenhouse Plastic - 50' x 35'	1750	\$ 0.1406/ sq ft	\$246.05	N
Wire Lock - 150' in 8' lengths	19	\$5.65	\$107.35	N
Wiggle Wire - 150'	37	\$0.84	431.5	N
Landscape Fabric	150ft	\$1.00	\$150	N
Hardware	Misc		\$150	N
Total			\$1495.5	

Deadline for data and photo submission:

October 31, 2018

Acknowledgements

We thank Aabir Dey of the Bauta Family Initiative on Canadian Seed Security for guidance with set-up and best practices, and Joanne Henderson with the Thunder Bay Seed Savings Collective for sharing her experience growing seed in northern Ontario. We also thank members of the Advisory Panel, Jason Hayes, Rebecca Ivanoff, Ken Laing, Annie Richard, Darrell Roes, Steven Wolgram and Dr. Ralph Martin, for their thoughtful input that helped guide the design of this trial.

Memorandum of Understanding

Please refer to efao.ca/research-mou for Memorandum of Understanding.

Contact

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Funding

Funding for this project was made possible by support from the Ontario Trillium Foundation and George Weston Limited and Loblaw Companies Limited.

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Farmer-led Research Program, efao.ca/research-library



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