SEED PRODUCTION & BREEDING

Spinach Variety Trial for Northwestern Ontario Seed Production

Farmer-Researchers:
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Janna van Blyderveen - Roots to Harvest - North

Research Priorities: Seed Production, Varietal Selection and Breeding

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Objective

The purpose of the trial is to identify which varieties of spinach are well suited for seed production in northwestern Ontario. As it seems that the region is a viable, but not ideal, location for spinach seed production. This project will seek to see if there is a difference among varieties when it comes to viable, vigorous seed production. This trial will also seek to access which planting dates produce the best spinach seeds.

Research Plan

Time	Task	Methods & Measurements or Action Item
March, 2020	Purchase Seeds	**Evalisa** will purchase seeds for all the farm sites.
Early May, 2020	Plant Seeds of First Sowing	Spinach for the first sowing will be planted on **all farm** sites. **Rebecca** will text Evalisa as a reminder.
June 2020 or when able.	Invoice	**All farmers** will send Sarah an invoice for all pre-approved research expenses with copies of the original receipts.
Late June/early July, 2020	Evaluate Leaf Quality of First Sowing	Spinach leaf evaluations on **all farm** sites. **Rebecca** will text Evalisa as a reminder.
Early August, 2020	Harvest First Sowing	**All farm** sites will harvest seed and record data. **Rebecca** will text Evalisa as a reminder.
Mid August, 2020	Plant Seeds of Second Sowing	Spinach for the second sowing will be planted on **all farm** sites. **Rebecca** will text Evalisa as a reminder.
October 15, 2020	Submit data and photos	**All farmers** will submit data and photos to Rebecca
November, 2020	Plant Seeds of Third Sowing	Spinach for the third sowing will be planted on **all farm** sites. **Rebecca** will text Evalisa as a reminder.

November 15, 2020	Invoice	**All farm** sites send Sarah invoices for farmer-fee.
Early June, 2021	Evaluate Leaf Quality of Second Sowing	Spinach leaf evaluations on **all farm** sites. **Rebecca** will text Evalisa as a reminder.
Early June, 2021	Evaluate Leaf Quality of Third Sowing	Spinach leaf evaluations on **all farm** sites. **Rebecca** will text Evalisa as a reminder.
Mid/Late July, 2021	Harvest Second Sowing	**All farm** sites will harvest seed and record data. **Rebecca** will text Evalisa as a reminder
Mid/Late July, 2021	Harvest Third Sowing	**All farm** sites will harvest seed and record data. **Rebecca** will text Evalisa as a reminder.
September, 2021	Submit data and photos	**All farmers** will submit data and photos to Sarah. **Rebecca** will text Evalisa as a reminder.

Experimental Design

The trial will evaluate 6 varieties of open pollinated spinach, each planted at 3 planting dates and on three farms. The planting dates will serve as three replicates.. There will be 3 replicates of the trial, and each replicate will plant all spinach varieties at 3 different times.

The 3 sites:

- Root Cellar Gardens
- Roots to Harvest Lillie St. Seed Garden
- Lakehead University Community Garden

The 6 varieties of open pollinated spinach:

Variety	DTM	Leaf-type	Season	Source	Notes
Longstanding Bloomsdale	45	Savoyed	Spring/fall	High Mowing	Cold hardy
Abundant Bloomsdale	45	Savoyed	Spring/fall	High Mowing	High yield
Giant Winter	50	Savoyed	Fall/overwinter	HIgh Mowing	Cold hardy
Butterflay	40	Semi-savoyed	Spring/fall	High Mowing	Productive
Matador	43	Flat	Fall/overwinter	High Mowing	Cold hardy
Popeye	40-50	Savoyed	Spring/fall	Root Cellar Gardens	Late bolting

Three plantings of each of the varieties will be done:

Estimated Planting Date	Leaf maturity	Seed maturity
Early May, 2020	Late June/early July, 2020	Early August, 2020
Mid August, 2020	Early June, 2021	Mid/Late July, 2021

November, 2020	Early June, 2021	Mid/Late July, 2021

General growing guidelines:

- Growers will plant ten feet of each variety and then spinach to 3” between plants.
- TheyGrowers will create a border around their trial of buffer crops not included in the trial, asto minimize “edge effects”, mechanical damage, or pests and critters.
- The crops that make up the border can be other varieties of spinach, or other types of crops.
- Growers will avoid the edge of the field and the end of the bed when finding a place for the trial, as well as any areas with known soil, shade, or irrigation differences that would affect some plots more than others.
- Each farmer will create their own random order for the varieties by either drawing variety names out of a pile/hat or randomly choosing which packet of seeds to plant next (see below for layout options).
- Stakes will be used to label the plots and farmers will draw a field map showing the order and location of varieties.

In a row:

Buffer
Abundant Bloomsdale
Giant Winter
Matador
Butterflay
Popeye
Longstanding Bloomsdale
Buffer

Or in a block:

Buffer	Buffer
Giant Winter	Butterflay
Matador	Abundant Bloomsdale
Popeye	Longstanding Bloomsdale

Buffer	Buffer

Evaluation

Growers will evaluate spinach in the same way for all planting dates, as follows..

Stage	Trait 1	Data to be gathered for this trait	Trait 2	Data to be gathered for this trait
Emergence	Germ rate	Seeds sown/seeds germinated	Vigour (rogue)	Number of plants rogued out?
Full leaf/leaf maturity	Disease (rogue)	Number of plants rogued out? With notes of disease?	Do you like it? (production, uniformity, taste, etc). Is it worth growing?	Yes or No
Bolting	Early bolting (rogue)	Number of plants rogued out due to bolting? With notes?	Date crop bolts	Date bolting first observed
Seed production	Lodging	Number of Plants that lodged		
Harvest	Seed yield	Total grams/ounces? Per bed foot?		
Germination	Seed germ rate	Seeds sown/seeds germinated	Vigour	Rating out of 5

Growers will harvest seed from each variety. Spinach seed is ready for harvest when the plants have dried down fully. Ideally, plants are left to dry down in the field. If harvested before dry, look for fully formed seed on the stalks. If needed, plants can be harvested in their entirety and hung or laid out to dry down completely.

Upon the completion of the trial there will be the following seed lots to test and evaluate:

Variety	1 = RCG-spring	2 = RCG-Summer	3 = RCG – fall	4 = R2H-Spring	5 = R2H - Summer	6 = R2H-Fall	7 = LU - Spring	8 = LU-Summer	9 = LU - Fall
A = Longstanding Bloomsdale	1A	2A	3A	4A	5A	6A	7A	8A	9A
B = Abundant Bloomsdale	1B	2B	3B	4B	5B	6B	7B	8B	9B
C = Giant Winter	1C	2C	3C	4C	5C	6C	7C	8C	9C
D = Butterflay	1D	2D	3D	4D	5D	6D	7D	8D	9D
E = Matador	1E	2E	3E	4E	5E	6E	7E	8E	9E
F = Popeye	1F	2F	3F	4F	5F	6F	7F	8F	9F

*RCG = Root Cellar Gardens, R2H = Roots to Harvest Lillie Street Garden, LU = Lakehead University Community Garden

Weighing and germination testing of harvested seed lots will be done by Root Cellar Gardens. For replicate sites, seed need only be harvested, labeled according to the chart above, and returned to Root Cellar Gardens.

Data collection sheet:
https://docs.google.com/document/d/1RHSka4DgtE8A4ivQvTI4kMTp4O6ZzYmRJqiK2YAsvkY/edit?usp=sharing

Materials

Please list all the equipment that you need for this project. Indicate “in-kind” under Total Cost for any materials that you already own or have access to. For pre-approved research expenses, for which you will be reimbursed, please indicate cost.

Material	Quantity Required	Total Cost*	Note
Seeds	¼ lb/variety	High Mowing order: RCG Popeye: $75	Ev will purchase seeds

* For approved research expenses

Memorandum of Understanding

Farmer-researchers agree to keep an active membership with EFAO throughout the duration of their trial. Reimbursement for research expenses and farmer-fees will be paid to current members only.

Please also refer to efao.ca/farmer-led research for a **Memorandum of Understanding** of other responsibilities. Specifically refer to sections:

- *What is expected of me as a farmer-researcher?*
- *What support will I receive from EFAO as a farmer-researcher?*

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.