

In search of short season northern sweet potato varieties: Selection and evaluation of new sweet potato (*Ipomoea batatas*) crosses



SEED PRODUCTION & BREEDING



Farmer-Researcher

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Project timeline:
Spring 2018 - 2022

IN A NUTSHELL

As demand for sweet potatoes grows in Canada, breeders are working to create sweet potatoes that are adapted to eastern Ontario.

In the first year of the project, Kate selected sweet potatoes that are best suited for low input, organic systems in eastern Ontario.

Progress to Date

- Kate evaluated nearly 60 genetically unique and diverse sweet potato tubers.
- After final evaluations of taste and storability, Kate will choose 15 varieties and trial them in 2020.
- Kate collected seeds from the vines that produced seed, which is germplasm for future breeding.

BACKGROUND

Most varieties of sweet potatoes need a long growing season because they become 'injured' when temperatures are low, and thus are not suited for eastern Ontario. As hexaploids (i.e. six homologous sets of chromosomes) sweet potatoes are genetically diverse, which means there is potential for regional adaptation. But to get new genetic diversity, plants need to be grown out (vs cloned) and produce flowers followed by viable seeds. This is difficult because most varieties of sweet potato show self- and cross-incompatibility, low natural flowering ability and low seed fertility.

In 2016 - as the first step to breeding a regionally adapted variety - freelance breeder Telsing Andrews at Aster Lane Edibles planted Georgia Jet (the most reliable northern variety) and Purple sweet potato plants. Luckily, they produced flowers and some open pollinated seed! The next year, Telsing planted these seeds, as well as seeds from a Swedish sweet potato (Nordic White X Purple) and some tropical sweet potatoes that she acquired from an enthusiast in Britain.

Kate Garvie has now taken on this project and was able to grow slips from the wide diversity of tubers produced in 2018 with the hopes of evaluating the nearly 60 unique crosses and finding something that is well suited to her farm.

METHODS

With 59 unique F1 varieties, there was not enough space or capacity to do a replicated variety trial to select the best. In 2019, therefore, Kate planted out one replication of 59 blocks containing 3-4 plants of each variety, with the goal of selecting 15 of the best to do a replicated variety trial in 2020.



Photo: Example of some of the diversity in the tubers.

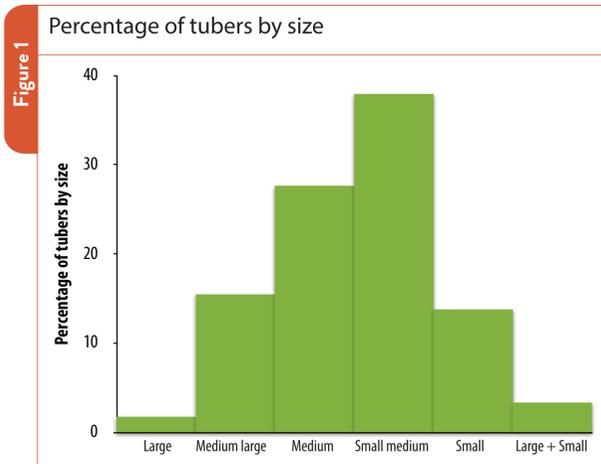
RESULTS

The slips that Kate planted produced incredibly diverse plots of sweet potatoes. Of the 59 plots planted, one plot had all slips fail to grow, one plot only had one plant and 49 of the plots had all three slips grow and produce tubers. On average each plant produced 13 tubers, with on average 5 marketable tubers.

Kate selected the top performers in terms of yield (number of tubers and number of marketable tubers), shape (round versus elongated), and ease of harvest. They range in colour from orange, purple, and white flesh, with red, purple, hot pink and yellow skin.

Marketable Yield

Only 25% of plots had 50% or more marketable tubers. Marketability, however, was based on size, meaning the cool season and the heavy clay at Kate's may have negatively affected marketable yield. Kate will cull all the varieties with small tubers, and select those with a high number of marketable tubers.



Ease of Harvest

Ease of harvest is an important trait for small market gardeners, especially for those like Kate with heavy clay soil. One quarter (25%) of the plots had dispersed roots that were challenging to find and harvest without damage. The optimal root formation is compact, but not tangled. Kate will select for optimal root formation in 2020.

Seed Production

Over three quarters (75%+) of the new crosses flowered and 61% produced new seed that can be used to grow more diversity in the future.

Table 1: Flowering and Seed Production Statistics from Year 1

Plots with flowering plants	75.9%
Varieties that produced seed	61.4%
Varieties that produced over 20 seeds	21.1%
Varieties that produced over 100 seeds	1.8%

NEXT STEPS

Kate will conduct taste tests later this winter and evaluate storability. Using all of the data, Kate will select the 15 best sweet potatoes, which she will use to create slips in spring 2020. During the 2020 season, she will conduct a randomized, replicated trial to further evaluate these varieties.



Photos: Slips growing in the greenhouse prior to planting out in the field (top). Large white skinned tubers being harvested (left). Tuber with light purple and peach flesh (right).

ACKNOWLEDGEMENTS

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