

# Southern Ontario Participatory Pepper Breeding Project



MULTI-FARM



SEED PRODUCTION &amp; BREEDING



Farmer-Researchers

Kim Delaney

Hawthorn Farm Organic Seeds - West

Annie Richard

Kitchen Table Seed House - East

Greta Kryger

Greta's Organic Garden - East

Rebecca Ivanoff

SeedWorks Plant Breeding Club - West

Kathy Rothermel

Kitchen Table Seed House - East

Project timeline:

Winter 2016 - 2020

## IN A NUTSHELL

Five members of the plant breeding club SeedWorks continued to select and stabilize a genetically diverse red pepper population, as well as uniform progeny lines. Progress was made towards stabilizing the developing varieties, despite a hard season for peppers.

Progress to Date

- Growers made progress towards stabilizing the progeny lines of yellow peppers.
- Growers made progress towards a releasable, diverse red pepper population.
- Growers will formalize the stabilization and aim to send new varieties to market in 2020.

## BACKGROUND

This project started in 2016 using seed obtained from Dr. Michael Mazourek's breeding program at Cornell University of a cross made between commercial varieties Ace and Aristotle. The 2019 season was the fourth year of growing out the cross Ace F1 x Aristotle F1 at three different locations in the province (Ottawa, Wolfe Island/Kingston, Acton/Hillsburgh/Guelph). The farmers are growing a Mass Selected Population and two different projects of Progeny Lines. The mass selected population will always hold more genetic diversity and, therefore, be more variable. The progeny lines offer more stable lines, for growers who require that. In Autumn 2018, the plant breeding club SeedWorks was formed. This project will continue forward under the auspices of this group.

## METHODS

### Breeding Goals

To breed an early, blocky pepper with good flavour that is adapted to ecological growing systems in southern Ontario.

### Breeding Methods

For their **yellow progeny line**, Kim and Greta grew out 12 plants of each selection of the best yellow peppers from last year (4-5 selections). They covered each of the plots of 12 plants to allow peppers to self-pollinate. Once fruit formed, they removed the cover and marked the selfed fruit with nursery marker or flags. Progeny lines that did not meet the criteria were discarded, and the best plants of the best 2-3 plots were saved to grow out again next year. Note that the same process was planned to take place for the red progeny lines at Kitchen Table Seed House, but a crop failure due to weather prevented this.

In addition to the progeny lines, Rebecca, Greta, and Annie and Kathy also grew the **mass selected population**. They separated the breeding plots from each other, and all other peppers, by at least 45 meters or kept the peppers under isolation with a physical barrier. This year they collected seeds from their favourite blocky, red, flavourful, red peppers, and saved that seed as stock for the 2020 breeding work. They also harvested seed from many more early ripening, blocky, flavourful peppers, which they will use for grow-outs in variety trials in 2020.

## RESULTS

Farmer	Date Seeded	Date Transplanted	Date of Mature Fruit	Days to Maturity	Days to Maturity for Ace F1
<b>RED MASS SELECTION</b>					
Annie and Kathy	April 1	June 18	September 29	103	n/a**
Greta	March 24	June 19	August 25	67	n/a**
Rebecca	March 28	May 26*	August 7	73	85
<b>YELLOW PROGENY</b>					
Kim (line A1)	April 1	July 2	October 25	115	
Greta	March 24	June 19	August 20	62	

\*Temperatures on June 4th went down to 2°C.

\*\*Ace F1 plants were part of a red pepper trial that was a crop failure at both locations.

### Red Mass Selection

Although there were no check plants of the early ripening Ace F1 at two of the trial locations this year, the mass selection population started to ripen over a week earlier than the Ace F1 at the third location, showing clear progress in the selection for early maturation.

The mass selection still showed variability but less than in previous years. For example: out of the 116 plants grown by Rebecca, only 4 plants had yellow and there were no fluted (highly scalloped) peppers.

### Yellow Progeny

At Kim's farm, all 12 varieties of peppers that she grew out for seed were very late to ripen, and some needed to be brought in before the last frost and hung to ripen in rafters. One of the progeny lines was significantly more uniform, early, and blocky than the rest. Despite the hard season, the progeny line that Kim selected was sweet and tasty and had a nice crunch to it.



**Photos:** 2019 mass selection pepper in Rebecca's garden (left). G1 yellow progeny line at Greta's Organics (right).

Peppers at Greta's farm were also slow to ripen; however two of the progeny lines were able to ripen much sooner than many other varieties. Greta selected two progeny lines for future evaluation.

### Red Progeny Line

Due to the wet, cold spring followed by a lot of heat and no rain, the red progeny lines were a crop failure at Kitchen Table Seed House.

## NEXT STEPS

SeedWorks Plant Breeding Club hopes to work next year with the Bauta Family Initiative on Canadian Seed Security to have their mass population trialed through the Canadian Organic Vegetable Improvement Project (CANOVI) network of trials. This will give them data on how well these peppers grow in organic fields across Canada and how well other farmers like the selection.

As Annie was not able to evaluate the red progeny lines this season, she will grow the lines in a heated greenhouse near Kingston. This will allow the group to evaluate the lines for uniformity and taste and hopefully be able to release a red stable variety sooner along with the yellow lines.



**Photos:** Isolation tunnels at Hawthorn Farm (left). 2019 mass selection pepper #4 at Kitchen Table Seed House (right).

## Acknowledgements

We thank Dr. Michael Mazourek and the members of his plant breeding lab at Cornell University for their expertise and encouragement.

Photo of Kim Delaney is courtesy of SeedChange.

