

# EFAO HORTICULTURE 2020: Research Protocol

Southern Ontario Participatory Pepper Breeding Project



SEED PRODUCTION  
& BREEDING

Farmer-Researcher: Annie Richard and Kathy Rothermel, Kitchen Table Seed House - East  
Greta Kryger, Greta's Organic Gardens - East  
Kim Delaney and Aaron Lyons, Hawthorn Farm Organic Seeds - West  
*Rebecca Ivanoff, SeedWorks (West/East) - not participating in 2020*

Research Priorities: Seed Production, Varietal Selection and Breeding

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## Objective

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

## 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 will be 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 yellow and red progeny lines offer a more stable line of each colour, 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.

For more information, please refer to:

[Protocol 2017](#)

[Report 2017](#)

[Protocol 2018](#)

[Report 2018](#)

[Protocol 2019](#)

[Report 2019](#)



### Specific Objectives & Measurable Outcomes

The *specific objectives* of the project are to **P.1)** release a genetically diverse but relatively uniform, flavourful, red bell pepper bred for organic field conditions; **P.2)** release a uniform flavourful red bell pepper suited for organic field conditions; **P.3)** release a uniform flavourful yellow bed pepper suited for organic field conditions.

*Measurable outcomes of this project* for the objectives are further stabilization of the mass selected lines of red peppers, as measured by the percent of yellow peppers present and the visual observation of relative uniformity within the population (**P.1**) and market readiness of the seed for all lines (**P.1, P.2, P.3**).

### Research Plan

Time	Task	Methods & Measurements or Action Item
March 25th to April 15th	Seeding of pepper seed (progeny lines, mass selection and two check varieties)	Rebecca will email the team
May 20th to 27th	Transplant peppers into the field and cover them for isolation.	Rebecca will email the team
		Invoice for research expenses
Mid August to mid September	Record date of first ripened fruit, start flagging plants with early ripening fruit.	Rebecca will email the team
Late August to late September	Take a photo of representative ripe fruit alongside check varieties	Rebecca will email the team
Late August to late September	Have a blind tasting of selected fruit alongside check varieties	Rebecca will email the team
Late August to late September	Take measurements of progeny lines as per the record sheet	Rebecca will email the team
Late August to late September	Reminder to collect more seeds for a bulk supply in 2020	Rebecca will email the team
Deadline October 1	Submit data and photos for breeding project (all)	Submit data and photos to Rebecca



Deadline October 31	Submit data and photos for Pepper Variety Trial (Annie)	Submit data and photos to Rebecca	SEED PRODUCTION & BREEDING
Before November 15	Invoice	Send Sarah invoice for farmer-fee	

### Experimental Design

The group is continuing to work on both a wide population of mass selected blocky red peppers, and two progeny lines, one of red and one of yellow.

For all lines, the group will use the **Pepper Descriptor Form** ([Greta's](#), [Kim's](#), [Annie's](#))

For the yellow progeny lines, **Kim** will grow out 12 plants of each selection of the best yellow peppers from last year (4-5 selections). Each of the plots of 12 plants will be covered to allow peppers to self-pollinate. Once fruit has formed, she will remove the cover and mark the selfed fruit with nursery markers or flags, or if the isolation cages are large enough to show the plant structure they can be left on. The same process will take place for the red progeny lines that **Annie** will grow out at Kitchen Table Seed House. Progeny lines that do not meet the criteria will be discarded, and the best plants of the best 2-3 plots will be saved.

**Greta, Kim, and Annie** will also grow the mass selected population, in addition to the progeny lines. This year they will save the seeds from our favourite blocky, red, flavourful, red peppers, and save that seed as stock seed for our 2021 breeding work. They will also harvest seed from additional early ripening, blocky, flavourful peppers, which they can use for releasing in 2021. They will be separated from each other, and all other peppers, by at least 45 meters.

They will continue to hold blind taste tests to confirm that selections are indeed more flavourful than their parent varieties.

Annie will also use seed from the mass selected population as a variety in a replicated variety trial she will be performing as part of a program run through the Bauta Family Initiative on Canadian Seed Security. The SeedWorks red mass selection population will be compared to Yankee Bell, King Arthur, King Crimson, Ace, King of the North (Fedco strain), Red Knight, and Sprinter on at Kitchen Table Seed House, a farm near Thunder Bay and near Kitchener.

### Materials

Approved research expenses are as follows:

- \$1,000 towards insect netting and landscape fabric
- \$56 for potting mix
- \$500 for greenhouse rental

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- \$300 for shipping seed to each other and to the CANOVI network.
- \$400 for travel to cover approximate mileage for two grower meetings (\$0.45CAD/km)

Farmer-fees: \$4,000 total for the group, invoiced to EFAO after data is submitted. Fee distribution within the group will be decided by the group, and farmer-researchers can invoice separately for their portion of the stipend or the group can invoice as a whole.

Note, this stipend is greater than the other trials because it is funded in 2020 by the Organic Farming Research Foundation.

### 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](https://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](mailto:martina@efao.ca).

### Funding

Organic Farming Research Foundation