

Participatory Plant Breeding

Fall 2020 Newsletter

Greetings from The Bauta Family Initiative on Canadian Seed Security! This newsletter will provide updates on various aspects of our PPB programming as we all wrap up the season and prepare for the holidays. We hope all of you and your extended farm families are healthy and safe as 2020 comes to a close. This past season has brought its share of challenges, and it has been inspiring to see everyone work so hard to adapt to the new realities. Thanks to all of you for making this year a success, and we hope to be able to see each other in person in the future!

The PPB newsletter has been distributed to farmers in the participatory plant breeding program in collaboration with the University of Manitoba since 2013. In the past year, the Bauta Family Initiative team has taken on the responsibility of this newsletter.

This fall, we are expanding the newsletter to include updates on other participatory on-farm research projects, including work with vegetable crops. We will not necessarily cover every single program in every newsletter, so if you are involved in a project that is not mentioned here, it will probably show up in a future newsletter. We hope you enjoy this broader scope and encourage you to follow up with your [Regional Coordinator](#) if you are interested in any of the programs highlighted here.

PPB Wheat and Oat Update

Martin Entz and his team in the Natural Systems Agriculture lab at the University of Manitoba have completed their second year of evaluating farmer-selected lines of wheat and oat with funding from the Organic Science Cluster 3.

There have been three groups or cohorts of farmers selecting wheat and oat lines since 2011. As described by Martin Entz: “Between 2011 and 2014, we worked with just a few farmers, mostly in our home province of Manitoba. Between 2013 and 2016, we worked with farmers from across Canada, thanks to the financial support of the Bauta Family Initiative. A new set of farmer selectors started their on-farm selection in 2017 and many of these lines were ready for field testing in 2020. The three farmer cohorts and associated field testing of the farmer developed wheat and oat lines is shown in Table 1.”

Table 1. Description of wheat and oat PPB program farmer cohorts, timing of on-farm selection and field testing of each cohort’s selections.

Cohort of farmers	Time period for on-farm selection	Field testing farmer selections
1	2011-2014	2015, 2016
2	2013-2016	2017, 2019
3	2017-2019 (ongoing)	2020, 2021

In 2020, field experiments for cohort three were conducted in Quebec, PEI, Manitoba, Saskatchewan and Alberta. The planned experiments in PEI experiments were cancelled in 2020 due to Covid19 restrictions. In general, farmer selections had a higher tolerance to stress than check varieties. Please see the [Mid-Term PPB report 2019-2020](#) prepared by Martin Entz, Michelle Carkner and Katherine Stanley for a summary of the results of the trials. They are working on a comprehensive report with all of the data to share in 2021.

Sending in wheat or oat selections for cleaning: If you are currently doing selection on a wheat and/or oat cross that was distributed to you through the University of Manitoba, you can send your selection of wheat or oats for threshing and cleaning. The seed will be sent back to you in time for the next planting season. The laboratory will also retain a sample of your selection in their seed bank, as a backup that you can request in a future year if your on-farm sample is destroyed (e.g. flooding, pests, etc.). The sample may also be used for evaluation purposes. The mailing address for your seed samples is: Martin Entz, University of Manitoba, Department of Plant Science, 222 Agriculture Building, 66 Dafoe Road, Winnipeg, Manitoba, R3T 2N2

Bulking up seed from your PPB selections: In the past, Martin Entz has offered the service of bulking up seed from PPB selections to a farm-scale volume for a cost-covering fee. If you are interested in bulking up your seed, please contact Martin directly.

Potato PPB Update

There are three cohorts of farmers who have been or will be involved in the PPB potato selection program, as outlined in Table 2.

Table 2: Description of potato PPB program farmer cohorts, timing of on-farm selection and field testing of each cohort's selections.

Cohort of farmers	Time period for on-farm selection	Field testing farmer selections
1	2013-2017	2016, 2017
2	2016-2020	2019-2021
3	2021-2023	2024-

Cohort 1 description and update:

The first cohort received tubers from Benoit Bizimungu at Agriculture and Agri-Food Canada in Fredericton (AAFC) in 2013. The program was managed as a collaboration between the University of Manitoba, AAFC, and the Bauta Family Initiative and participating farms. The University of Manitoba administered the funding and coordinated the program. The Bauta Family Initiative provided support regionally, and coordinated regional trials. AAFC made the initial potato crosses and is the partner with the capacity to collaborate with the participating farms to move any successful selections forward on the path to becoming registered varieties that can be sold as certified seed potatoes.

The original structure of the program was for three years of on-farm selection (2013-2015), following the methods of the [PPB potato selection manual](#). During this time we all learned a lot about organic potato breeding and participatory breeding in Canada. Our Research Manager, Helen Jensen, says that: “Personally, some of my best Bauta Family Initiative work memories are from the process of making and evaluating potato selections on participating farms.”

After the three years of selection (2013-2015), the selected lines were tested in 2016 at research centres (in Manitoba and Fredericton) and in 2017 at the CETAB+ (in Quebec). The results of the tests from 2016 and 2017 are all available on the Bauta Family Initiative Website (www.seedsecurity.ca):

- 2016: Carman, Manitoba ([English only](#), en [Anglais seulement](#))
- 2017: Victoriaville, Quebec ([English](#), [French](#))

Thanks to your excellent work and participation, a number of potentially interesting new potato selections were identified, with specific traits responding to the needs of organic growers. In particular, many of the lines have high yields in organic conditions, equal or superior to that of check varieties. One farmer selection shows very promising scab-resistance. A number of selections have good resistance to herbivory by the Colorado potato beetle. In a taste test, a yellow fleshed farmer selection received rave reviews.

It can take a number of years to move a potato selection through the stages of cleaning and multiplication so that it can be sold. The first step is to make a “tissue culture”, that will serve to produce disease-free tubers. AAFC in Fredericton has already done this process for four of the farmer selections, and will be doing the same for eight more selections during the winter of 2021. This will prepare the selections to eventually move through the steps to become registered varieties that are available to organic farmers. They will also work to collect more detailed information on scab resistance and Colorado potato beetle resistance using specific disease nurseries and plots with insect pressure.

Cohort 2 description and update:

The second cohort received a diverse mix of potato tubers to select from in 2016, 2017 or 2018. The crosses were made by Dr. Duane Falk. We hope you have enjoyed narrowing down that initial mix of tubers to a small number of potential varieties that you like. These varieties belong to you, no one other than yourself has any claim to them as intellectual property. You may at

this time be witnessing some accumulation of disease in your tubers. This can be difficult to deal with in potatoes. We have produced a [factsheet on potato disease](#) to provide some general best practices and suggestions.

We wish to support producers from the second cohort in the evaluation of their lines, and have some funding secured for a replicated trial plot at AAFC, Fredericton. Unfortunately, it was not possible to implement a full trial in 2019 due to limited amounts of seed potatoes and the research site was closed in 2020 due to COVID19. We would like to ensure that you are able to obtain data concerning your varieties in 2021. There are two potential options for this.

- (1) Conducting a replicated trial at AAFC Fredericton. This is contingent on the station being operational in 2021, and will depend on the evolution of the COVID19 situation. This trial will require that participants are able to submit enough material of their line to generate 90 seed pieces for planting.
- (2) Participants can conduct an on-farm trial of their own lines, by growing them out along with a reference variety collecting data. The design, data collection, and analysis would be supported by the Research Manager of the Bauta Initiative. This option requires saving enough seed potatoes of your selections to do a trial that is at a relevant scale for you (i.e. that fits in your available space, that you have time to manage, and that is big enough that you can draw some conclusions).

For those who would like to participate in either type of trial, please ensure that you have saved a good quantity of seed potatoes. Please ensure that you store your seed potato according to your best storage practices (in the dark, at a low temperature). Below are guidelines from AAFC on seed potato storage and volumes, although these may not be strictly applicable on all farms and I encourage you to adhere to your own best practices, since you have the best knowledge of your own equipment and conditions.

From AAFC: “Ideal storage temperatures for seed is 38oF (3.3 oC) at a RH of 90% or higher with good ventilation. For seed, if they want to give us seed from their smalls (1.5-2”), we could probably use it as whole seed, but it would have to be of marketable quality (good condition, not diseased, firm turgor, no growth cracks or knobs). However, we could also use their Canada #1 grade (2-3.5”) and use it as cut seed. We estimate approximately 6 seed pieces per lb of material or 13 seed pieces per kg (this is a conservative estimate so that we have enough to work with). So 15 lbs of Canada #1 should give us 90 seed pieces.”

In the coming year, the Bauta Initiative Team aims to provide you with a number of different supports in working with your varieties:

- 1) Offer the opportunity to test your lines for the presence of glycoalkaloids (a toxin that is naturally occurring in all potatoes, but can sometimes be present in excessive amounts) in Fall of 2021. For more detailed information on glycoalkaloids, please refer to [this factsheet prepared by our policy team](#).
- 2) Provide you with a “roadmap” document that outlines the options and costs if you wish to register a potato variety for selling as food or seed.

- 3) Offer a one-time grant to help offset a portion of the costs for those who wish to pursue variety registration.

Cohort 3: New collaboration with the Bishop's University and the Consortium de Recherche sur la Pomme de Terre du Québec.

We have new funding for a structured PPB program working with partners at Bishop's University (Sherbrooke, QC) and the research center of the Consortium de Recherche sur la Pomme de Terre du Québec (CRPTQ) (Pointe aux Outardes, QC) to develop late-blight resistant potato varieties suited to organic agriculture using molecular markers. This project is funded by the **Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec** (MAPAQ) and the Consortium de Recherche sur la Pomme de Terre du Québec (CRPTQ).

If you are a producer based in Quebec who is interested in participating in this project, or a student interested in research opportunities related to this project please contact [Hugo Martorell](mailto:hmartorell@weseedchange.org) (hmartorell@weseedchange.org) or Helen Jensen (hjensen@weseedchange.org) for more information.

Studies of wheat, oat and potato PPB systems and value chains in Canada

There is increasing interest in studying the PPB process in Canada and identifying ways to improve and continue the work.

If you are currently participating, or have in the past participated in the PPB wheat or PPB oat program, you may have been interviewed by Iain Storosko from Carleton University in Ottawa this past season. Thank you for sharing your knowledge and perspectives with Iain, who is working towards his M.Sc. in geography. His goal is to learn more about on-farm PPB from the point of view of the farmer-breeder, and how it fits into an overall farm plan. This research will allow us to learn more about the process of PPB in Canada, and provide valuable information for developing future programs. Iain has now completed 20 interviews with producers across the country, and is currently analysing the data from his interviews. He will be bringing an early version of his results to a PPB farm club meeting in the New Year, to both share and receive feedback on his analysis and interpretation. The identity of participants will remain confidential. Iain's work is supported by MITACS and the Organic Farming Research Foundation. If you did an interview with Iain, please submit the paperwork he gave you to claim your honorarium if you have not already done so.

A new graduate student is also beginning a collaboration with the PPB program. [Murray Jowett](#) is currently working towards a M.Sc. degree in the Natural Resources Department at the University of Manitoba, under the supervision of [Iain Davidson-Hunt](#). Murray is interested in mapping value chains (either existing or in development) for products derived from PPB varieties and will produce graphical illustrations of these value chains. If you are interested in working with Murray to have the value chain, or potential value chain, for your PPB varieties

mapped, please contact your [Regional Coordinator](#), or the Research Manager (Helen Jensen, hjensen@weseedchange.org).

CANOVI (Canadian Organic Vegetable Improvement) Vegetable Variety Trials

The Canadian Organic Vegetable Improvement (CANOVI) project was launched in 2019, as a partnership between the University of British Columbia and the Bauta Family Initiative and funded through the [Organic Science Cluster 3](#). Through the CANOVI program, we coordinate a national network of participatory variety trials for vegetables on organic farms. The CANOVI program also includes a project to breed an orange carrot variety adapted to organic conditions and suited for organic seed production in Canada. You can learn more about the CANOVI program [here](#).

Dr. Alex Lyon was the CANOVI project manager at the University of British Columbia's Centre for Sustainable Food Systems (CSFS) until July 2020. She has moved on to a teaching position, and will be replaced in January 2021 by Dr. Solveig Hanson, who recently completed her Ph.D in beet breeding at the University of Wisconsin-Madison. Welcome Solveig!

In 2020, the crops selected for trialing were: radicchio (a diverse crop that remains novel in many regions), rutabaga (a cold-season adapted winter storage crop for food security), red carrots (a culturally relevant crop for many communities in Canada) and orange storage carrot (a staple winter storage crop). This format of decentralized, on-farm research proved to be well-adapted to the COVID19 pandemic, and we had much higher participation than anticipated (see figure).

CANOVI trials

Crop	# trials
Rutabaga	34
Red carrot	35
Orange carrot	32
Radicchio	42
Red bell pepper (ON)	3
Total trials	146
Total participants	63



The Regional Coordinators of the Bauta Initiative developed a series of crop specific webinars to replace the usual field days and visits. These webinars boast a stellar lineup of expert speakers, as well as some great cooking tips, and can be found [here](#).

We have been working hard to make the 2021 variety trial data available as soon as possible, so that it can be informative to you as you plan your seed purchases for 2021. You may also consult the data from 2019 in the Tableau software application [here](#). Please note that you can select specific crops, specific regions and specific traits to help you visualize the data you are most interested in.

For participants who have not already done so, please complete your data upload, end of season survey, and submit your invoice. Instructions for this are [here](#).

Flashback! OP leafy greens variety trial reports from 2014

The “OP Leafy greens variety trials” was a pilot project coordinated by the Bauta Family Initiative in the spring and fall of 2014. The goal was to develop a methodology and collect data on leafy green crop varieties of interest for Canadian organic market gardeners and seed producers through a participatory network of variety trials conducted on organic farms. The learnings from these trials helped to inform the development of the current CANOVI variety trials. Due to transitions in the program, however, the full data sets were never published. Here we present the compiled data for [Spinach \(*Spinacia oleracea*\)](#), [loose-head Chinese cabbage \(*Brassica rapa ssp. pekinensis*\)](#), and [barrel-head \(Napa\) Chinese cabbage \(*Brassica rapa ssp. pekinensis*\)](#).

Podcast

The Bauta Family Initiative launched their new podcast, “SeedHeads”, in October 2020. In this cross-pollinating podcast, Canadian seed heroes tell their stories, share their “how-to” tips, and talk about the seeds they love. Learn more and give it a listen [here](#).