

Canadian Agri-Science Cluster for Horticulture 3



Update to Industry

Final Report – 2018 - 2023

Activity title:

16A: Variety Evaluation

Name of Lead Researcher:

Erica Fava, Agriculture and Agri-Food Canada

Names of Collaborators and Institutions:

BC: Heather Meberg, ES Cropconsult Ltd; BC Agriculture in the Classroom, University of the Fraser Valley
AB: Chandra Singh, Lethbridge College; Michele Konschuh, University of Lethbridge; Parkland Seed Potatoes
SK : Jazeem Wahab, AAFC Saskatoon
MB: Darin Gibson, Gaia Consulting Ltd; Dr. Tracy Shinners-Carnelley, Peak of the Market
ON: Dr. J. A. Sullivan and Vanessa Currie, University of Guelph; Ontario Potato Board
QC: André Gagnon, Progest Inc. 2001; Sophie Massie, Progest Inc. 2001; Kristine Naess and Amina Abed, Consortium de recherche sur la pomme de terre du Québec (CRPTQ)
NB : Matt Hemphill, Potatoes NB; NB Department of Agriculture, Aquaculture and Fisheries
PEI: Mary Kay Sonier, PEI Potato Board; Bennett Crane, AAFC Charlottetown; Real Potatoes

Activity Objectives (as per approved workplan):

This activity aims to enhance the profitability and sustainability of the Canadian potato industry by identifying superior selections that can be produced more efficiently than current potato varieties in major production areas. Evaluations included: adaptation; yield performance (total and marketable); external and internal quality; cook quality; and visually-rated reaction to pests and disease as compared to industry standards when grown under regional conditions at 8 trial sites across Canada. Evaluations were performed on three market types including: French Fry, Fresh Market and Chip types.

- Production of breeder's selection seed at Benton Ridge Substation (NB) and distribution to cooperators for National Potato Variety Trials (NPVT) (10-30 clones)
- Production of breeder's selection seed at Vauxhall Substation (AB) and distribution to cooperators for NPVT (10-30 clones)
- Conduct National Trial in NB (in coordination with NB Ag)- (20-60 clones) site TBD
- Conduct National Trial in Saskatchewan- (20-60 clones) Outlook site
- Conduct National Trial in PEI - (20-60 clones) Harrington site
- Coordination of NPVT and collection of data from all trial sites
- Data analysis and report
- Cooperators meeting to review the data

Research Progress & Results *(use plain language, not to exceed 1,000 words):*

The project builds on existing and new collaborations between AAFC potato breeding program with regional collaborators and a network of trial sites located in eight provinces. Fresh market, chip, and French fry market types were tested every year under representative production practices using a 2-tiered trialing system. The locations for the trials included sites in Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and Alberta with a demonstration site in British Columbia. All sites, had trials each year with the exception of 2020 when the NB site was cancelled due to the pandemic.

The objective of this research was to identify intermediate and advanced breeding lines from the Agriculture and Agri-Food Canada (AAFC) national potato breeding program that are adapted to specific, or to many production regions, with the potential to directly benefit the Canadian potato industry. The potato sector faces numerous challenges, including competition in the marketplace, increasing costs of production, unpredictable growing conditions as well as environmental sustainability. New improved potato varieties are expected to help industry meet these challenging production conditions and consumer demands. The AAFC Potato Breeding Program is active in addressing these issues by developing and selecting breeding lines with high yield, genetic resistance to major pests and diseases, tolerance to environmental stresses, and suitable end-use qualities.

The breeder's selection seed was multiplied and maintained at both of AAFC's seed farms in Vauxhall, AB and Benton, NB. Seed was successfully delivered to all collaborators of the National Potato Variety Trial and to industry partners in all years. There was a severe drought in 2020 and this effected the amount of seed that could be distributed to the collaborators in 2021 and 2022 and industry partners in 2021. In 2021 and 2022, the number of replicates and the distribution of the seed to collaborators in the trials depended on seed availability and market type.

The AAFC Potato Breeding Program initiated a two-tiered trialing system in 2019 for all National Trial locations. Selections in Tier 1 were in their first year of the National Potato Variety Trials and selections in Tier 2 were in the trials for a second year. The selections were compared to industry standard varieties in multiple locations in target production areas over two growing seasons before their release to industry for commercial-scale testing. The trials started in a Randomized Complete Block Design with 2 replicates for the Tier 1 selections and 4 replicates for the Tier 2 selections. In subsequent years, the trial was planted as a partially replicated design with 1 to 2 replicates of each selection depending on seed availability. Trials were planted, grown and harvested following commercial production practices common in the local area. Field trials were coordinated by AAFC and relevant performance information were provided to stakeholders. Promising selections identified through this evaluation were transferred to the potato sector through Material Transfer Agreements allowing for non-exclusive testing leading to exclusive testing and eventual commercialization.

In 2019, the season was very dry in the East. The 2020 season was very hot and dry at all the sites. Differences in how the selections performed were mostly due to availability of irrigation. The 2021 season was very hot across the country but the heat was extreme in the West and this was coupled with a lack of rain. In the East, the precipitation amounts were typical and timely and this resulted in high yields. In 2022, the East had seasonable temperatures and precipitation. In the West, there were some delays in planting because of precipitation in the spring, most notably in BC and MB. The differences in temperature and precipitation allowed for evaluation of the selections for heat and drought tolerance. In 2020, VF140855-07 and VF140855-11 were identified as selections that performed comparably to the checks in areas that did not have drought stress, but performed better than the checks in areas that did have drought stress. These two selections continue to be field trialed by industry in 2023.

During this project, there were ten graduates of the NPVT that were or will be offered to industry for field trialing. Of these ten lines, there are 5 French fry lines, 2 chip lines and 3 Fresh market lines. Many of the graduates have been evaluated for multiple years by various industry partners. Because of the nature of the pipeline, whether or not these lines will be taken by industry will only be seen during the next Cluster.

The biggest impact of the pandemic was not having the field days and other in-person meetings across the country. However, methods of meeting with industry partners virtually increased. Over the course of this project, 76 selections were trialed in the NPVT, 33 selections moved on for a second year of trialing, 10 advanced selections were distributed to industry for field trialing.

It is difficult to assess the impact of the new varieties released through this project because it takes time to multiply and produce commercially available seed and to develop the market for a new variety. However, through a coordinated and collaborative approach, this project has delivered 4 non-exclusive variety licenses (AAC Brookville, AAC Madam Blue, AAC Alta Rose and Rochdale Gold Dorée) and 20 exclusive variety licenses (AAC Eastern Russet, AAC Blue Sapphire, AAC Odyssey, AAC Santa Margarita, AAC Shirley, AAC Red Berry, AAC Robin, AAC Griffin Russet, AAC Canada Gold-Dorée, AAC Burcadie, AAC Africadie, F11007, AAC Moccasin, AAC Blaze, AAC Red Rover, AAC Arctic, AAC Midnight, AAC Crimson Tide, AAC Alta Strong and AAC Red Fox), during the life span of the project. The majority of these varieties (71%) were Fresh Market types, and the remaining lines were either dual purpose Fresh market and French fry (17%) or French fry (12%) varieties. Some of these varieties are starting to have seed grown in Canada. According to the CFIA seed inspection for 2022, AAC Midnight, AAC Arctic, AAC Crimson Tide and AAC Canada Gold-Dorée had 8.6, 13.7, 17.1 and 19.7 hectares of seed grown, respectively.

Key Message(s):

The key statement(s) from the project highlighting the benefit to industry.

In this last cluster, a main focus of the AAFC Potato Breeding Program was to increase the number of selections available to industry that have disease resistance. As part of the new protocols for the Potato Breeding Program, lines are being screened earlier in the pipeline for markers associated with PVY, PVX and golden nematode resistance. Recently genetic markers for Potato Wart resistance have been added to the suite of tools and have been mainstreamed into the breeding program. Improved protocols for inoculating tubers with Fusarium Dry Rot and inoculating leaf samples with late blight have been developed and are being used to assess the tolerance to these diseases. In addition, the lines in the NPVT are also evaluated for susceptibility to common scab in a trial in Fredericton, NB and Harrington, PEI. A summary of the tolerance of the graduates from the NPVT and varieties that were issued licenses to these diseases is given in Table 1. The dark green fill indicates a resistant line and the lighter green fill indicates moderate resistance. In total there were 34 lines that were either graduates of the National Potato Variety Trials or varieties that were issued licenses. Of these 34 lines, 6%, 35%, 11% and 3% have markers associated with resistance to PVY, PVX, golden nematode and potato wart, respectively. In the Late Blight leaf inoculation tests, 11% of the lines showed a moderate resistance and 3% a high resistance. The Fusarium dry rot tuber inoculation tests showed 3% of the lines with a moderate resistance. Fifty-three and 15% percent of the lines showed a moderate and high resistance to common scab, respectively. In the next cluster, the focus will be to improve upon the disease resistance of material that is available to industry. As the methods and protocols continue to improve for assessing the tolerance of a line to various diseases, it can be expected that the percentages of lines offered to industry with resistance will increase.

Table 1: Summary of disease resistance of lines given Variety License Agreements and lines requested by industry for field trialing

Name	Market	PVY	PVX	Golden Nematode	Potato Wart	Late Blight	Fusarium DR	Common Scab
AAC Africadie	FM	R (RyADG)	R	S	S (Sen3)	.	.	.
AAC Alta Rose	FM	S	S	S	S (Sen3)	.	.	MR
AAC Alta Strong	FF/FM	S	S	S	S (Sen3)	.	.	.
AAC Arctic	FM	S	S	R	S (Sen3)	.	.	MR
AAC Blaze	FM	S	R	S	S (Sen3)	.	.	MR
AAC Blue Sapphire	FM/FF	S	S	S	S (Sen3)	.	.	MR
AAC Brookville	FF	S	S	S	S (Sen3)	S	.	R
AAC Burcadie	FF/FM	S	S	S	S (Sen3)	.	.	MS
AAC Canada Gold-Dorée	FM	S	S	S	S (Sen3)	MR	.	MR
AAC Crimson Tide	FM	S	R	S	S (Sen3)	.	.	MR
AAC Eastern Russet	FM	S	S	S	R (Sen3)	MR	.	R
AAC Griffin Russet	FF/FM	R (RyADG)	S	S	S (Sen3)	.	.	R
AAC Madam Blue	FM	S	.	.	S (Sen 1 & 4)	MS	.	.
AAC Midnight	FM	S	R	S	S (Sen3)	MR	.	MR
AAC Mocassin	FF	S	S	S	S (Sen3)	.	.	MS
AAC Odyssey	FM	S	S	S	S (Sen3)	MR	.	MR
AAC Red Berry	FM	S	R	R	S (Sen3)	.	.	MR
AAC Red Fox	FM	S	R	S	S (Sen3)	.	.	MR
AAC Red Rover	FM	S	S	S	S (Sen3)	.	.	MR
AAC Robin	FM	S	R	S	.	.	.	MR
AAC Santa Margarita	FM	S	S	R	S (Sen3)	.	.	.
AAC Shirley	FM	S	S	S	S (Sen3)	.	.	R
CV15129-1	FM	S	MR
F14021	FF	S	S	S	.	.	MR	MS
F14119	FF	S	R	S	.	.	S	MS
F160025-03	FM	S	R	R	S (Sen3)	.	MR	MR
F160032-06	CH	S	R	S	S (Sen3)	MS	MS	MS
F160036-02	FF	S	S	S	S (Sen3)	MS	MR	R
FV16324-08	CH	S	R	S	.	.	S	MR
Not named (F11007)	FF	.	.	S	.	R	.	MR
Rochdale Gold-Dorée	FM	S	R	S	S (Sen3)	S	S	MS
VF14016	FF	S	S	S	.	.	S	S
VF140855-07	FF	S	S	S	S (Sen3)	S	MS	MR
VF140855-11	FF	S	S	S	S (Sen3)	S	MS	MR

Overall benefit to industry:

Expand the key message(s) and provide all grower-relevant details in a form easy to assimilate and compare.

By having the trials in the major potato growing regions of Canada, identifying selections that perform well in the regions as well as across Canada can be identified. By working closely with the potato industry in Canada, it becomes possible to identify potential selections that will satisfy the market needs and breed for concerns that the industry is facing and is likely to face in the future, keeping the Canadian potato industry competitive in North American and international markets. Breeding is a long-term endeavor, having the input from industry as early as possible is necessary to ensure that there will be varieties available to suit the needs of industry in a changing climate. Developing varieties that have the agronomic and quality traits coupled with disease resistance, heat and drought tolerance is a huge challenge and requires a collaborative approach. The AAFC Potato Breeding Team has been fortunate to have the support and engagement of the potato industry across the country and to work alongside engaged and knowledgeable collaborators that enjoy close relationships with industry. We hope to build on these successful collaborations and relationships in order to meet the challenges that the industry faces in the future.

This project is generously funded through the Canadian Agri-Science Cluster for Horticulture 3, in cooperation with Agriculture and Agri-Food Canada's AgriScience Program, a Canadian Agricultural Partnership initiative, The Fruit & Vegetable Growers of Canada and industry contributors.



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Update to Industry

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Activity title:

Activity 16B – End-use focused variety development – Alberta

Name of Lead Researcher:

Dr. Chandra Singh, Lethbridge College

Names of Collaborators and Institutions:

Dr. Michele Korschuh, University of Lethbridge

Activity Objectives (as per approved workplan):

The purpose of the research project is to pool resources from a range of sources and evaluate potential potato varieties for industry adoption using a cooperative approach. Often, there are economies of scale realized when varieties are evaluated collectively rather than individually. Lethbridge College worked with Alberta Agriculture and Forestry to provide regional data in an impartial setting. This work builds on previous projects and provides continuity for the Alberta industry participants involved in potato variety development. We plan to evaluate 40 to 60 cultivars each year to ensure regional data is available for industry to use in the selection and marketing of new varieties.

- 1) Provide data to variety developers to assist in decision-making,
- 2) Provide preliminary agronomic data to assist producers with adoption of new cultivars,
- 3) Address the gap between identifying promising new varieties from breeding programs and the adoption of varieties for use in the industry.

Research Progress & Results (use plain language, not to exceed 1,000 words):

First two years (2018 and 2019) of the trials were led by AB Agri and Forestry but then due to lack of research and tech staff support at AB Ag and Forestry, Lethbridge College took the lead on the project and conducted the trials in 2020, 2021, and 2022.

In 2018, 94 varieties were evaluated for agronomic and culinary purposes. Varieties were provided by private industry and the AAFC national breeding program. AAFC evaluated 22 French fry, 15 chipping and 22 fresh market clones. Industry evaluated 3 creamer varieties, 8 chipping varieties, 8 French fry varieties, and 16 fresh market varieties. 5 entries were also evaluated in early harvest plots to generate some agronomic information to support production of new varieties. Data collected included emergence data, stand count, total yield, yield by size category relevant to end-use, specific gravity, internal defects, and external deformities. Some samples were returned to stakeholders for bruise testing, storage assessments or culinary testing by the stakeholders.

In 2019, Alberta trialed 137 varieties.

In 2020, 57 varieties were evaluated for agronomic and culinary purposes. Varieties were provided by private industry and the AAFC national breeding program. AAFC evaluated 16 French fry, 9 chipping and 6 fresh market clones. Industry evaluated, 7 chipping varieties, 7 French fry varieties, and 12 fresh market varieties. 20 entries were evaluated in alternate N plots to generate some agronomic information to support production of new varieties.

In 2021, 61 varieties were evaluated for agronomic and culinary purposes. Varieties were provided by private industry and the AAFC national breeding program. AAFC evaluated 23 French fry, 8 chipping and 7 fresh market clones. Industry evaluated, 7 chipping varieties, 7 French fry varieties, and 9 fresh market varieties. 23 entries were evaluated in alternate N plots to generate some agronomic information to support production of new varieties. Data collected included emergence data, stand count, total yield, yield by size category relevant to end-use, specific gravity, internal defects, and external deformities. Some samples were returned to stakeholders for bruise testing, storage assessments or post-harvest testing by the stakeholders. Local production data supports adoption of new potato varieties that will enhance the competitiveness of our potato industry.

In 2022, Trials were conducted in Brooks by Lethbridge College staff in 2022. AAFC trials included 13 French fry lines, 9 chipping lines and 12 fresh market lines. Industry trials were conducted with 5 French fry lines in large plot trials, and small plot trials with 3 French fry lines, 13 fresh market lines and 6 chippers at two levels of N.

All the field data has been shared with industry and AAFC.

Key Message(s):

The key statement(s) from the project highlighting the benefit to industry.

Industry was able to participate in trials and evaluate the varieties of their interest without any disruption during the COVID period as well as after AB Agriculture and Forestry laid off research and field staff at CDCS Brooks. Lethbridge college successfully managed the project.

Overall benefit to industry:

Expand the key message(s) and provide all grower-relevant details in a form easy to assimilate and compare.

Industry was able to evaluate the varieties in Southern Alberta climatic conditions during the trials. This would help them in select varieties that can be grown in Alberta.

These trials are important for industry stakeholders to collect regional data for promising new varieties. The value-chain nature of the trial and efforts to provide data as required for each stakeholder is likely to result in the uptake of new varieties for the Canadian potato industry.

The AAFC National Potato Breeding Program is focusing its efforts to work unison with all stakeholders to increase the value of the program to the Canadian Potato Industry and Canada.

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Update to Industry

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Activity title:

Canadian Potato Variety Evaluation **16B** (Manitoba Fresh Market)

Name of Lead Researcher:

Dr. Tracy Shinnars-Carnelley, Peak of the Market Ltd.

Activity Objectives:

The objective of this research was to evaluate the yield and quality parameters of red-skinned/white flesh, yellow, white, russet, and creamer potato varieties and assess their potential as fresh market varieties for Manitoba.

Research Progress & Results:

The 2022 field season marked the last year of this activity. Fifty-five potato varieties were evaluated at the Peak of the Market Ltd. Research Site located in Winkler Manitoba. The trial included red-skinned/ white flesh, yellow, white, russet, and creamer types, as well as the industry standards. The trial was established and managed by type i.e. reds, yellows, creamers, and where possible agronomic practices were suited to the type of variety.

The varieties evaluated in this trial were provided by private breeders, breeder's Canadian agents, and variety developers. The gross yield produced by the 20 red varieties ranged from 417 cwt/ac – 693 cwt/ac, with six of the entries yielding over 600 cwt/ac. The standards Dark Red Norland and Wisconsin Norland yielded 546 and 537 cwt/ac, respectively. Red Prairie, at 693 cwt/ ac, was the only red entry that had a total yield significantly higher than the standards. Russetting and silver patch continue to be the most prevalent defects on the red varieties, with incidence ranging from 0-58% for russetting and 0-60% for silver patch.

The 14 yellow varieties evaluated yielded between 403 cwt/ac – 618 cwt/ac, with Actrice yielding the highest. The industry standards Musica and Colomba had lower yields of 588 cwt/ac and 608 cwt/ac, respectively, but were not significantly different than Actrice. Colomba, Acoustic and AAC Canada Gold were the most attractive entries; while skinning and russetting were the most prominent defects observed on some of the yellows.

The six russet varieties evaluated yielded between 449 cwt/ac – 639 cwt/ac, with the top performer being Eastern Russet (639 cwt/ac) which was significantly higher yielding than the industry standard, Goldrush (554 cwt/ac). These varieties also had an attractive appearance suitable for the fresh market.

Seven white varieties were evaluated in the 2022 trial. The yields in this category ranged from 493 cwt/ac – 708 cwt/ac. Volare (708 cwt/ac) had a significantly higher yield than most other white entries except for Whitney (640 cwt/ac). Skinning, russetting, and surface cracking were the common defects noted on the whites after washing.

Over the 5-year period some varieties performed consistently well with respect to high yield and acceptable market qualities. Dark Red Norland and Wisconsin Norland are the current industry standard red varieties and continued to demonstrate this during the term of this project. Fenway Red and Cristina were also consistent high yielding varieties with suitable quality attributes. In recent years, both of these varieties have graduated to on-farm evaluation and are being grown for commercial production. Since 2021, Red Prairie was included in the trial and based on two seasons of evaluation has the potential to be another high yielding, attractive red skinned- white flesh variety.

Many yellow varieties have been evaluated since 2018. However, the consistent top performing varieties have been Musica and Colomba. In addition to high yield, they both have very low defects like russetting, and appear to be tolerant to heat and drought like was experienced during the 2020 and 2021 growing seasons.

The russet varieties included in this trial often included those considered dual purpose for both fresh market and processing. However, results with some of these dual-purpose types have shown that the tuber shape is too elongated for the fresh market baker type potatoes. Rickey Russet, Innovator and Goldrush were the top performing russet varieties over the term of the project. During this same time, Innovator has become the main fresh market russet variety grown in Manitoba.

Round white potatoes have not typically been grown in Manitoba for the fresh market. During the duration of this activity, interest in this market class increased so round white varieties were added to the trial for the first time in 2019. Since that time, Audrey and Volare have been the top yielding varieties. Volare has also transitioned to on-farm evaluation and commercial production has begun in Manitoba.

The specialty and creamer potato category provided an opportunity to showcase some varieties to Manitoba growers. The varieties included over the years has varied, but AAC Red Viola has consistently demonstrated excellent marketable qualities like deep red skin and low incidence of blemish defects.

The most common defect observed on the smooth-skinned varieties was russetting. Varieties like Musica and Colomba appear to be less susceptible to this defect, and this is a contributing factor to the ongoing success of these varieties. Silver patch was identified on the red-skinned varieties each year. This defect is a skin blemish that is silvery in appearance but does not form distinct lesions like silver scurf or black dot. The cause of silver patch is unknown, and to date, no pathogens have been isolated from affected tubers. In multiple years of variety evaluation, dark Red Norland sports (phenotypic variants) of Red Norland consistently have had the highest incidence of this defect. This is an important finding because it suggests that there is a genetic predisposition for this defect. This is important for the future evaluation and selection of new red skinned varieties.

Key Message(s):

The trial provided information of the performance of fresh market varieties evaluated under southern Manitoba conditions. Results from this trial informed growers on potential new varieties suitable for their markets. Multiple years of evaluation for some varieties demonstrated their adaptability to regional conditions and stresses like heat and drought.

- Dark Red Norland remains a top performing red-skinned variety and new varieties like Fenway Red and Cristina have potential to increase commercial production.
- Musica and Colomba have become the Manitoba industry standards for yellow fresh potatoes due to consistent high yield and low defects.
- Innovator and Goldrush are top performing fresh market russets
- Round white varieties are a relatively new segment of fresh market potato production in Manitoba, and Volare is a promising variety for this class.

Overall benefit to industry:

Growers are very interested in evaluating and identifying new varieties that have improved yield, quality, or other agronomic or nutritional attributes compared to the current industry standard varieties. Trials like this allow for efficient evaluation and comparison of many varieties from different breeders or developers and help to increase the likelihood of identifying varieties with potential for production in Manitoba.

This project is generously funded through the Canadian Agri-Science Cluster for Horticulture 3, in cooperation with Agriculture and Agri-Food Canada's AgriScience Program, a Canadian Agricultural Partnership initiative, The Fruit & Vegetable Growers of Canada and industry contributors.



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Update to Industry

Final Report – 2018 - 2023

Activity title: Evaluation of potato selections and varieties for central Canada

Name of Lead Researcher: Dr. K. S. Jordan and Dr. J. A. Sullivan

Names of Collaborators and Institutions: University of Guelph, Ontario Potato Board, Stuart Cairns Potato Research Committee (through FVGC)

Activity Objectives

1. Identify and evaluate processing potato selections with long term storage potential.
2. Identify and evaluate tablestock lines for value added traits such as early maturity, coloured skin and flesh, and specialty market potential.
3. Identify and evaluate very early maturing selections for use by the processing industry.
4. Evaluate elite selections for tolerance to scab (*Streptomyces scabies*)

Research Progress to Date

Field trials were conducted in Ontario to evaluate potential new selections for the potato industry. Early generation material developed by AAFC Fredericton was selected for adaptability in Ontario. The selections are then maintained in the AAFC system for further testing. Our evaluations include a comprehensive measurement of agronomic traits such as vine vigour, maturity, yield, appearance of tubers. Culinary quality is evaluated through boiling and baking tests. Samples of the lines with chip potential are stored in a commercial storage and evaluated for quality characteristics.

Trials were conducted for processing (ie. chips), table stock and specialty markets.

Early Maturing Chip Trial

Over the course of the project, approximately 35 lines with early maturity were grown in a replicated trial at C. J. Bradley Farms in Leamington Ontario. Plots were harvested each season at about 90 days from planting and evaluated for yield and chip quality. Promising results were obtained from F160032-06, F160032-16 and F170066-04. Results have been shared with industry and AAFC so that steps can be taken toward commercialization.

AAFC trials- National and Advanced selection

Over the course of the project, over 150 elite breeding lines were grown in replicated plots at the Elora Research Station. Selections have potential for fresh market, chip processing, creamers and specialty (health) markets. Data was collected on plant vigour, maturity, yield and tuber quality. Samples from lines with chip processing potential were stored in a commercial facility and were evaluated monthly throughout the storage season for specific gravity, chip colour, and sucrose and dextrose measurements.

In addition, AAC Red Fox (Fresh Market – red) was issued a license

Main Crop Chip Trial

Over the course of the project, over 80 promising chip lines were obtained through collaborations with other breeding programs including the University of Wisconsin and Michigan State University, Sunrise Produce, La Patate and WD Potato and local cooperators. Replicated field trials were grown at the Elora Research Station. Data were collected on yield and chip processing quality at harvest. Samples were stored in a commercial facility and evaluated monthly for specific gravity, chip colour, sucrose and dextrose. Samples stored at 4°C and 8°C for five months were also evaluated.

Main Crop Tablestock Trial

Throughout the project, over 75 promising fresh market selections plus standards were obtained through collaborations with other breeding programs, including the University of Wisconsin and Michigan State University, Konstar, Sunrise Produce and local cooperators. Replicated plots were grown at the Elora Research Station. Data were collected on agronomic characteristics (ie. maturity, yield, tuber appearance) and culinary quality (ie. specific gravity, boiling, baking,)

Early Generation Selection of Breeding Lines

During the course of the project, approximately 1000 selections with potential for fresh market and chip processing sectors were grown in 4 hill plots at the Elora Research Station. Approximately 40 lines were selected and were advanced through the system. By selecting earlier generations in Ontario there was an advantage in identifying lines which are adapted for central Canada. This will also be an important tool towards adapting to climate change.

On-farm Trials

These trials were conducted in collaboration with the Ontario Potato Board and Dr. Eugenia Banks. Each season, Dr Banks conducted trials on commercial farms located in major growing regions. Overall, approximately 250 promising new varieties and advanced selections from breeding programs were evaluated in non-replicated plots in commercial fields in the Alliston and Hamilton areas. Scab tolerance was evaluated in the on-farm trials each year and reported to growers.

Key Message(s):

The need to produce a continuous supply of high quality potatoes is an ongoing challenge to Canadian potato growers. Producers require varieties which generate profitable yields under sustainable production systems. This dynamic situation creates a requirement for a steady stream of new, value-added varieties. In 2022, over 100 advanced selections and new varieties from the AAFC National Potato Breeding program and other breeding programs were evaluated. We made selections from early generation breeding lines to determine adaptability to Ontario conditions. Storage quality tests are ongoing throughout the winter. On-farm trials and scab evaluations were conducted in commercial fields. Results from the trials are reported to the industry through the annual reports and regular meetings. The potato industry will have access to new, high quality varieties along with current performance data from multiple field sites.

Overall benefit to industry:

The trials conducted through the Agri-Science Program Cluster 3 are a valuable variety prospecting tool for everyone in the potato industry. They provide detailed evaluations of new potato varieties and compare regional data for the industry specific traits needed. The value-chain approach of the research and collaborative knowledge transfer plan results in greater uptake of new varieties for the Canadian potato industry. This benefits producers and consumers to the detriment of none. The reports provide current and detailed results which can easily be used by all private and public stakeholders.

The AAFC National Potato Breeding Program is focusing its efforts to work collaboratively with all stakeholders, thus increasing the value of the program to the Canadian industry. For French fry selections, three requests were made for F14021 and five requests for VF14016 by industry partners, based on their success over multiple locations and/or their own experience trialing the material. The fresh market selection,

F14119, was requested by 8 industry partners and the Tier 2 Chip selection, FV16324-08 was requested by 5 industry partners for further trialing. In 2022, two new selections were issued for non-exclusive field trialing. These were the two French Fry selections: VF140855-07 and VF140855-11. These were taken by 4 industry members.

The provincial variety evaluation trials provide excellent insight into local adaptability of promising new selections and varieties. These selections can be developed through private and public collaborations. Regional growing conditions and markets are key influencers in the evaluation.

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