



Canadian Agri-Science Cluster for Horticulture 2

Progress Report December 2014

<p>Activity 18, Potato 17</p> <p>Canadian Potato Variety Evaluation Program</p>
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<p>Collaborators</p> <p>Agriculture & Agri-Food Canada, Cavendish Farms, Progest, University of Guelph, Gaia Consulting, Alberta Department of Agriculture, ES Crop Consulting</p>
<p>Activity Objectives</p> <p>1. PEI - Variety evaluation: adaptation and yield trials & development of management profile of selected promising varieties.</p> <ul style="list-style-type: none"> • Conduct yield and adaptation trials of promising clones and new varieties under PEI conditions and select promising entries. • Develop management profile (best management practices) of selecting promising clones and varieties for recommendations to the growers <p>2. Quebec – Potato varieties and line evaluation</p> <ul style="list-style-type: none"> • Evaluate agronomic performance of varieties and advance lines under QC conditions; • Determine susceptibility to common scab of varieties and advanced lines under evaluation; • Determine tolerance to low fertilization of varieties and advanced lines under evaluation; • Determine tolerance to main potato diseases of varieties and advanced lines under evaluation; • Evaluate quality and culinary skills for fresh market of varieties and advanced lines under evaluation; • Evaluate cooking quality for process market of varieties and advanced lines under evaluation; • Bring diversity in the gene pool under evaluation; • Transfer valuable information to growers, crop consultant and extension personnel. <p>3. Ontario – Variety Development</p> <ul style="list-style-type: none"> • Identify and evaluate potato very early maturing selections for use by processing industry; • Identify and evaluate processing potato selections with long term storage potential; • Identify and evaluate table stock lines for value added traits such as early maturity, coloured skin and flesh, and specialty market potential; • Determine the health benefits of potatoes by measuring antioxidant potential and starch quality in elite lines.

4. Ontario – Nutrient Quality Evaluation of Processing and Table Stock Potatoes

- Screening processing and table stock varieties for nutritional qualities – assessment of protein, bioactives, antioxidant potential, and resistant starch content to meet consumer needs/preferences
 - i. Identify promising processing and table stock varieties with high protein content
 - ii. Identify promising processing and table stock varieties with high polyphenol and anthocyanin contents
 - iii. Determine the antioxidant potential of promising varieties
 - iv. Identify promising processing and table stock varieties high in resistant starch(fiber content)
- Screening processing and table stock varieties for canning, soups and stews
 - Identify promising processing and table stock varieties by screening for specific gravity with low sloughing and higher nutritional content
 - Characterize the starch composition and structure of identified varieties
- Screening the chip processing varieties for quality parameters for low temperature storage
 - Identify promising varieties suitable for Ontario conditions for low temperature by assessing the chip quality, color and reducing sugar content as a function of storage (time and temperature).

5. Manitoba – Evaluation and Adaptation of French Fry Potato Varieties

- Test processing potato varieties for their potential as replacement varieties for those presently grown in Manitoba
- Determine yield, grade and quality of three potato varieties to three N levels and three seed spacing.
- Evaluate interaction between variety, seed piece spacing and N fertility.
- Develop management strategies for each variety under Manitoba conditions.

6. Alberta – Variety Evaluation

- Pool resources and evaluate potential potato varieties for industry adoption, from a range of sources, using a cooperative approach

7. British Columbia – Variety Evaluation

- Evaluate the agronomic and culinary qualities of new varieties under BC growing conditions

Early Outcomes

1. PEI – A. Variety Evaluation – six standards, 4 clones and 23 new varieties or advanced breeding lines were submitted as part of this trial for evaluation under PEI conditions. Four replicates and an observation block were grown for each entry in collaboration with AAFC. An industry day was held in late August for interested parties to view the trial entries in the field. Harvest and grading have been completed.

PEI – B. Variety Evaluation – Development of management profile of selected promising varieties: Two sets of processing varieties (8 entries each) were evaluated under irrigated and dryland conditions at the research plots of Cavendish Farms from June to October, 2014. Different in-row planting distances were evaluated - 10” and 14” under irrigated condition and 12” and 16” under dryland condition. Total pay yield per treatment was determined following the commercial grading system of the company. Fry color and specific gravity (=dry matter) were also evaluated. Tubers of

selected varieties were stored at 45°F for further fry color and storability tests.

Another set of trial was conducted to look at the effects of fertilizer rates (150lbs NPK vs. 170lbs NPK) and planting distances (10" and 12" in-row plant spacing) of the new variety Arbor Globe and a promising red clone, AR2010-07; both fresh market type potatoes.

Data have been collected and will be analyzed statistically for all trials.

2. Quebec – Potato varieties and lines evaluation

Total of 61 clones/varieties and 5 control varieties were evaluated on two different sites in Quebec. The experiment was conducted in a randomized complete block design with three replicates. Harvest and grading have been completed. Internal (hollow heart, brown center and vascular discoloration) and external quality (common scab and rhizonctonia) as well as the specific gravity have been evaluated. The first (of two) evaluation of cooking quality for process has also been done.

3. Ontario – Variety Development

In 2014 five breeding lines and varieties were tested against three standards for early chipping potential. Yield and quality were measured at two harvest points. In 2013 and 2014, forty samples from chipping potato trials were stored in a commercial chip storage facility and tested for processing quality over 10 months. In 2014, forty lines and standards were tested in field trials and samples are currently being stored in a commercial facility for long term quality evaluations. In 2014, 75 tablestock lines were received from AAFC and other breeding programs for field trials. Lines were evaluated for agronomic performance, quality characteristics that include early maturity, coloured skin and flesh, organic and specialty markets potential. In 2014 300 early generation lines were evaluated for adaptability in Ontario. These included all markets. Approximately 10% were selected as having potential and will be tested in 2015.

4. Ontario – Nutrient Quality Evaluation of Processing and Table Stock Potatoes

Twenty processing varieties including advanced selections were selected from the replicated field trials conducted at Elora Research Station for processing qualities and nutritional analyses. A public talk was given on the nutritional qualities and benefits of potatoes on Potato field day organized at Elora Research Station in August 2014 and a popular article on health benefits of potatoes were published.

5. Manitoba – Evaluation and Adaptation of French Fry Potato Varieties

Three varieties (Bannock Russet, Blazer Russet, and Classic Russet) were tested under three different spacings and three different Nitrogen rates in order to determine their potential as replacement varieties for those presently grown in Manitoba. Emergence, soil and tissue, yield, grade and quality data of three potato varieties have been measured. Preliminary data has been presented to the Manitoba Potato Research group. The Bannock trial was damaged by excessive

rainfall during the season, and although the trial was harvested, it may not be possible to make conclusions based on the data collected, since one side of the trial was severely affected. This trial was situated at slightly lower elevation as compared to the other two, and consequently stayed wet longer than the other two after some heavy precipitation events. Both of the other variety trials provided good results. The Classic Russet variety seemed to perform best under tight spacing (10") and high N rates (225 lb actual N). Yield for this variety declined with wider spacing. As for the Blazer Russet trial, varying N or spacing did not affect total yield but did influence tuber size distribution. Increased N rates resulted in a higher proportion of large tubers (>12 oz). Tubers were also larger with wider in-row spacing. Initial French fry testing for Blazer indicated darker fries with higher N rates. Two more frying dates will take place over the winter (January and April). Data analysis is ongoing.

6. Alberta – Variety Evaluation

Potato Growers of Alberta and 9 industry participants provided funding and in-kind contributions (seed potatoes) for evaluation. AAFC provided 13 French fry clones, 11 chipping clones and 13 fresh market clones for evaluation. Industry participants provided 27 mainstream cultivars for evaluation and 41 cultivars for evaluation in the creamer market. 17 of the industry clones were grown at two rates of N to provide some preliminary agronomic information to clients. Four replicates and a demonstration block were grown for each industry entry, while only two replicates and a demonstration were grown with AAFC material. A field day was hosted in August to allow industry stakeholders an opportunity to view the entries prior to harvest. Harvest and grading have been completed. Culinary evaluations were conducted on the mainstream industry entries. Potatoes were made available to industry participants after grading for storage and additional evaluation as requested.

7. British Columbia – Variety Evaluation

Five standards, 11 numbered varieties and 36 new to BC varieties were included in the agronomic portion of this trial for evaluation under BC growing conditions. There were three replicated plots and a demonstration plot for each variety. A field day was held in late August with a turnout of over 125 growers and industry partners. Participants viewed harvested demonstration plots as well as the replicated plots. Harvest and grading have been completed. Culinary assessment is ongoing. Further information will be presented to growers at the LMHIA grower's short course in January.

Key Message(s)

Field trials as indicated in early outcomes have been completed. Grading, evaluation and data compilation and analysis is underway. Full reports will be available in April 2015.