

Project Report

**Alberta Potato Variety Development 2017
CDCS, Brooks, AB**

French Fry Potatoes

Prepared for:
Various Sponsors

Prepared by:

Michele Konschuh
Alberta Agriculture and Forestry
Crop Diversification Centre South
301 Horticultural Station Road East
Brooks, AB T1R 1E6

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Introduction

In Alberta, potato industry stakeholders are looking for replacement varieties that use less nitrogen, less water, less pesticide, yet yield superior processing or culinary quality and tonnage. An ideal French fry variety would have earlier maturity than Russet Burbank, be relatively tolerant of environmental fluctuations, have few defects, yield well and have specific gravity in the desired range (1.086 to 1.092). Good fry color out of the field is an asset, and good fry color out of storage is also very desirable. Varieties from breeding programs in Canada, Europe and the United States are often being assessed. Many breeding programs target disease resistance, nitrogen use efficiency and excellent storage potential in addition to increased yield. Tuber yield potential and nutritional requirements are impacted by variety characteristics and by environmental characteristics such as the length of the growing season (Westerman, 1993). As noted by Love et al. (2003), the full potential of a new variety may not be realized until proper management is implemented. There is increasing pressure on potato producers to utilize best management practices to reduce the environmental footprint for potatoes. The costs of such shifts in production practices will be borne primarily by producers.

The purpose of this project was to pool resources to evaluate potential varieties from a range of sources, using a cooperative approach. This trial was established to collect local agronomic data on varieties from breeding programs in Canada, the U.S. and elsewhere. The varieties were planted in replicated plots at the Crop Diversification Centre in Brooks, AB and were provided with 180 lbs/ac N (Medium N rate), 1609 lbs/ac (Early Harvest) and, if requested, 100 lbs/ac N (Low N rate). Alberta data is essential when selecting varieties appropriate for our climate, our customers and industry stakeholders.

Objectives

- A. To evaluate potential new varieties for French fry processing;
- B. To provide the potato industry an opportunity to assess varieties grown under local conditions;
- C. To compare varieties from several breeding programs (including AAFC) under Alberta conditions; and
- D. To determine the response of new French fry varieties to nitrogen fertilizer rates.

Materials and Methods

The variety evaluation was conducted in small plots at the Crop Diversification Centre South in Brooks, AB. Fertility for the Early Harvest plots (160 lbs/ac) was achieved through a combination of soil fertility (83 lbs/ac N; 253 lbs/ac P) and broadcast fertilizer (90 lbs/ac of 11-52-0) incorporated prior to planting. Early Harvest plots received an additional top-dressing (145 lbs/ac of 46-0-0) at hilling, for a total of 160 lbs/ac N. Fertility for the low N plots (100 lbs/ac) was achieved through a combination of soil fertility (83 lbs/ac N; 253 lbs/ac P) and broadcast fertilizer (90 lbs/ac of 11-52-0) incorporated prior to planting. Low N plots received an additional top-dressing (15 lbs/ac of 46-0-0) at hilling, for a total of 100 lbs/ac N. Moderate N plots received an additional top-dressing (189 lbs/ac of 46-0-0) at hilling, for a total of 180 lbs/ac N. Within each harvest or level of fertility, varieties were planted in four replicate rows in a randomized complete block design along with standard varieties (Russet Burbank and/or Shepody). Each block was planted adjacent to guard rows to reduce any edge effects (see plot plans, Appendix A).

Eptam 8E (1.8 L/ac) was applied prior to planting (May 4) to control weeds. Seed of standard cultivars was provided by Edmonton Potato Growers and seed of test cultivars was provided by each participant. Potatoes were planted May 18 (Early Harvest) May 30, 2017 (Low N Main) and May 29, 2017 (Moderate N Main) approximately 12 to 15cm deep using a two-row tuber unit planter. Seed was planted at 30cm spacing in 6m rows spaced 90cm apart. The plots were irrigated to maintain soil moisture close to 70%. Foliar fungicides were applied twice during the growing season to prevent early and late blight from developing (Table 1).

Table 1: Foliar fungicides applied to the potato crop in 2017 to prevent early and late blight development.

<i>Date of Application</i>	<i>Fungicide</i>	<i>Rate</i>
7 July	Ridomil Gold/Bravo	0.83L/ac
25 July	Quadris	324mL/ac



Figure 1: Variety evaluation trial at CDCS in Brooks, AB June 26, 2017.

The Early Harvest plots were harvested green. Reglone was applied (1.0 L/ac) September 1 to the Low N and Medium N plots. The Early Harvest plots were harvested August 14, 2017. The Low N plots were harvested September 14 to 15, 2017 and Moderate N plots were harvested September 12 to 13 using a 1-row Grimme harvester.

French fry tubers were stored at 8°C until graded. Tubers were graded into size categories (less than 113g, 113 to 170g, 170 to 284g, over 284g and deformed). A sample of twenty-five tubers (113 to 284g) from each replicate was used to determine specific gravity using the weight in air over weight in water method. These tubers were cut longitudinally to assess internal defects. A composite sample of 8 tubers (2 per rep) was stored at 8°C until culinary analyses were performed. Samples were evaluated for fry colour using a USDA colour chart in November 2017.

The data presented here have been statistically analyzed using ANOVA and Tukey's Multiple Comparison Test; (SPSS; $p \leq 0.05$). Statistical summaries are available upon request. T-tests were used to compare results for varieties grown at different levels of N.

Results and Discussion – French fries

Sample hills of each variety were dug for a field day at CDCS August 24, 2017. Photos of these varieties are shown in Figure 2.





Figure 2. French fry varieties at CDCS field day August 24, 2017: a) LW17-1, b) LW17-2, c) Russet Burbank, d) Shepody, e) ASPI010, f) EPG17-2, g) EPG17-3, h) ASPI17-2, i) Blazer Russet, j) Kennebec, k) ASPI17-1, l) ASPI17-3, m) ASPI17-4, n) Basin Russet, o) Bridget, p) Excellency, q) California Russet Burbank.

Yield data (total yield and marketable yield; ton/ac), mean tubers size (oz.) and specific gravities of each of the French fry cultivars are shown in Table 2. Two cultivars and two standard varieties were planted with a moderate rate of nitrogen and were harvested in August (Early Harvest). There were no significant differences in total yield between cultivars. Marketable yield of LW17-1 was not significantly different from that of Shepody or Russet Burbank in these plots. Mean tuber size of both trial cultivars was significantly lower than that of Shepody in these plots, but specific gravity was higher than either standard. LW17-2 appeared to require additional N or a longer season to reach its potential.

Another six cultivars and two standards were planted in low N plots (100 lbs/ac) and were harvested in September (Low N – main harvest). Total yield ranged from 14.3 for ASPI17-2 to 38.3 ton/ac for EPG17-3. The total yield of EPG17-3 was significantly higher than the check varieties and other cultivars (Table 2). Marketable yield of EPG17-3 was significantly higher than that of Shepody, but was not statistically different from that of Kennebec. Marketable yield of EPG17-2 was second highest, but not significantly different from the check varieties. Kennebec produced tubers with the greatest mean tuber size. Mean tuber size of EPG17-2, EPG17-3, and Blazer Russet were not statistically different from Shepody. Specific gravities ranged from 1.084 for EPG17-3 to 1.098 EPG17-2. Specific gravities of most of the entries were suitable for French fry production.

Fourteen cultivars and three standards were grown on a moderate level of N (180 lbs/ac) and harvested in September (Moderate N – main harvest). At this level of N, total yield ranged from 17.3 ton/ac for ASPI17-2 to 39.4 ton/ac of EPG17-3. Although there were some significant differences, most of the cultivars overlap with the standards. The total yield of EPG17-3 and ASPI17-1 was significantly greater than both standards in these plots. Marketable yield ranged from 14.0 ton/ac (ASPI010) to 33.9 ton/ac for EPG17-3. The marketable yield of EPG17-3 was significantly greater than yield of the standards, but was not statistically different from EPG17-2, ASPI17-1, Bridget, Excellency or Kennebec (Table 2). Mean tuber size ranged from 5.6 oz (ASPI010) to 10.7 oz for Kennebec, and most cultivars were not significantly different from the standards, Shepody and Russet Burbank. Specific gravity ranged from 1.079 for ASPI17-1 to 1.099 for LW17-2. Specific gravity of ASPI010, ASPI17-4, LW17-1, and LW17-2 were significantly higher than the standard varieties.

Total yield, marketable yield, mean tuber size and specific gravity of LW17-1 were all significantly affected by harvest date (Table 2). For LW17-2, the mean tuber weight was not significantly different between the August and September harvest dates, but total yield, marketable yield and specific gravity were higher at the September harvest.

Seven of the cultivars were grown at two levels of N. There were no statistical differences in total yield, marketable yield, mean tuber size or specific gravity for cultivars grown at 100 and 180 lbs/ac N in 2017. Specific gravity was significantly lower for ASPI17-2 grown on moderate N compared to low N. The specific gravity for other entries was not affected (Table 2).

Further addressing the agronomic needs of each variety may well result in improvements to yield and size profiles when compared to the results in this trial.

Table 2: Estimated total yield (ton/acre), marketable yield (ton/ac), mean tuber size (oz.) and specific gravity for each French fry variety grown on approximately 100 lbs/ac nitrogen (Low N), 180 lbs/ac nitrogen (Moderate N) and 150 lbs/ac nitrogen (Early Harvest). Data shown is the mean of four replicates. Data followed by the same letter in each column of the table are not significantly different at the $p < 0.05$ level.

CDCS	Yield (ton/ac)	Marketable Yield	Mean Tuber Size	SG
<i>Early harvest</i>				
LW17-1	12.9 a¥	5.1 a¥	5.0 b¥	1.080 a¥
LW17-2	11.4 a¥	1.1 b¥	5.0 b	1.079 a¥
Russet Burbank	13.6 a¥	5.7 a¥	5.7 ab¥	1.065 b¥
Shepody	11.2 a¥	4.9 a¥	5.8 a¥	1.067 b¥
<i>Low N – main harvest</i>				
ASPI010	25.8 bc	17.2 bc	6.4 c	1.097 ab
EPG17-2	30.3 b	26.0 ab	7.1 bc	1.098 a
EPG17-3	38.3 a	31.0 a	7.9 abc	1.084 b
ASPI17-2	14.3 d	13.4 c	7.9 abc	1.090 ab‡
Blazer Russet	23.6 bc	20.3 bc	8.9 ab	1.091 ab
Kennebec	27.5 bc	22.7 abc	9.6 a	1.087 ab
Shepody	20.3 cd	16.3 bc	8.6 ab	1.096 ab
<i>Moderate N – main harvest</i>				
ASPI010	27.2 b-e	14.0 d	5.6 g	1.098 ab
EPG17-2	30.1 b-e	24.9 abc	7.6 c-f	1.094 a-d
EPG17-3	39.4 a	33.9 a	8.9 abc	1.084efg
ASPI17-1	32.5 a-c	26.9 ab	8.3 bcd	1.079 g
ASPI17-2	17.3 f	15.3 cd	8.6 bcd	1.086 efg‡
ASPI17-3	28.3 b-e	21.8 bcd	8.6 bcd	1.086 efg
ASPI17-4	30.7 a-e	20.0 bcd	6.2 efg	1.097 ab
Basin Russet	23.7 def	18.6 bcd	8.4 bcd	1.092 b-e
Blazer Russet	21.3 ef	18.0 bcd	8.7 bcd	1.086 efg
Bridget	34.3 abc	26.9 ab	7.0 c-g	1.089 c-f
Excellency	34.0 ab	24.9 abc	7.1 c-g	1.086 efg
Kennebec	30.7 a-e	25.7 abc	10.7 a	1.084 efg
LW17-1	25.6 c-¥	21.7 bcd¥	7.4 c-g¥	1.096 abc¥
LW17-2	29.7 b-e¥	18.2 bcd¥	5.8 fg	1.099 a¥
California Russet Burbank	22.7 ef	14.3 d	6.7 d-g	1.084 efg
Russet Burbank	28.2 b-e¥	20.3 bcd¥	8.0 b-e¥	1.088 def¥
Shepody	25.3 c-¥	20.7 bcd¥	9.9 ab¥	1.082 fg¥

‡ Data between the moderate and low N plots was statistically different at the $p \leq 0.05$ level.

¥ Data between the Early Harvest and Main Harvest was statistically different at the $p \leq 0.05$ level.

The mean percentage of total tuber number in each size category is shown in Table 3. For cultivars harvested from Early Harvest plots in August, LW17-2 produced a significantly higher percentage of small tubers (< 4 oz) and a significantly lower percentage of tubers in the 4 to 6 oz. range compared to LW17-1 and the standards. LW17-2 may require a longer growing season to shift the size profile. LW17-1 and LW17-2 produced a significantly lower percentage of tubers in the 6 to 10 oz. category than either standard as well as a lower percentage of deformed tubers.

For varieties grown on low N (100 lbs/ac) and harvested in September, there were some differences in the percentage of tubers in each size category. In particular, ASPI010 had a significantly higher percentage of small tubers than the standards and ASPI17-2 produced a significantly greater percentage of tubers in the 6 to

10 oz. category compared to most other entries (Table 3). EPG17-2, EPG17-3, Blazer Russet, and Kennebec produced size profiles quite similar to those of the standards with a lower percentage of deformed tubers.

The size profiles of entries grown on moderate N (180 lbs/ac) differed between entries and some differed significantly from the standards. Most of the entries had a smaller percentage of deformed tubers than the standards. ASPI010 produced significantly higher percentages of small tubers (Table 3).

A comparison of LW17-1 and LW17-2 harvested in August versus September indicated a significant shift in size profile toward larger tubers, as expected.

Surprisingly, there were few significant differences in the percentage of tubers in each size category for potatoes grown on low N compared to moderate N (Table 3). Nitrogen had a greater impact on the size distribution for ASPI010. ASPI010 grown on moderate N produced significantly higher percentage of small tubers and significantly lower percentage of tubers in the over 10 oz. category than when grown on low N. These results suggest that ASPI10 may have better nitrogen use efficiency than Russet Burbank and may be suitable for low input production.

Table 3: Percentage of total tuber number in each size category (< 4 oz, 4 to 6 oz, 6 to 10 oz, > 10 oz, and deformed) for each French fry variety grown on approximately 100 lbs/ac nitrogen (Low N), 180 lbs/ac nitrogen (Moderate N) and 160 lbs/ac nitrogen (Early Harvest). Data shown is the mean of four replicates. Data followed by the same letter in each column of the table are not significantly different at the $p < 0.05$ level.

CDCS	< 4 oz	4 to 6 oz	6 to 10 oz	> 10 oz	Deformed
<i>Early harvest</i>					
LW17-1	60.8 b¥	29.9 a	8.2 b¥	0.4 a¥	0.7 b
LW17-2	91.0 a¥	6.9 b¥	1.7 b¥	0.0 a¥	0.4 b
Russet Burbank	47.9 b¥	21.4 a¥	17.5 a¥	2.7 a¥	10.5 a
Shepody	49.0 b¥	21.7 a¥	17.8 a¥	3.6 a¥	7.9 a
<i>Low N – main harvest</i>					
ASPI010	33.7 a‡	30.8 a	27.8 b	7.3 d‡	0.4 b
EPG17-2	13.4 bc	20.5 ab	41.9 ab	23.1 bcd	1.1 b
EPG17-3	13.6 bc	18.2 ab	34.2 ab	28.5 a-d	5.5 ab
ASPI17-2	5.5 c‡	19.2 b	49.4 a	25.2 a-d	0.7 b
Blazer Russet	11.9 bc	14.4 b	31.0 b	39.6 ab	3.1 ab
Kennebec	11.3 bc	10.5 b	24.8 b	47.2 a	6.2 ab
Shepody	14.8 bc	13.9 b	30.4 b	36.3 abc	4.7 ab
<i>Moderate N – main harvest</i>					
ASPI010	47.9 a‡	31.4 ab	18.4 de	1.6 g‡	0.8 d
EPG17-2	16.2 ef	21.1 cde	36.6 abc	24.7 a-f	1.3 d
EPG17-3	11.9 f	13.3 ef	32.6 abc	39.6 ab	2.5 bcd
ASPI17-1	16.5 cf	14.5 def	30.2 a-d	37.8 abc	1.0 d
ASPI17-2	10.3 f‡	15.9 c-f	35.5 abc	37.3 abc	1.1 d
ASPI17-3	16.2 ef	14.9 def	27.9 a-e	33.4 a-d	7.5 bcd
ASPI17-4	34.3 bc	32.8 a	23.2 cde	8.9 efg	0.8 d
Basin Russet	11.4 f	15.6 c-f	29.5 a-e	33.7 a-d	9.8 ab
Blazer Russet	12.9 f	15.6 c-f	28.9 a-e	40.2 ab	2.5 bcd
Bridget	21.2 def	25.0 a-d	33.2 abc	20.0 b-g	0.5 d
Excellency	28.7 bcd	26.2 a-e	27.8 a-e	15.5 c-g	1.9 cd
Kennebec	12.1 f	8.4 f	16.9 e	47.6 a	2.0 cd
LW17-1	13.6 ef¥	23.3 a-e	39.1 a¥	22.1 b-g¥	1.2 d
LW17-2	38.0 ab¥	32.3 a¥	23.9 b-e¥	4.6 fg¥	11.3 a
California Russet Burbank	25.6 bcd	24.0 a-e	27.6 a-e	11.4 d-g	12.6 a
Russet Burbank	15.9 ef¥	15.3 c-f¥	27.2 a-e¥	29.0 a-e¥	12.6 a
Shepody	9.0 f¥	9.0 f¥	26.7 a-e¥	45.8 a¥	9.5 abc

‡ Data between the regular and low N plots was statistically different at the $p \leq 0.05$ level. ¥ Data between the Early Harvest and Main Harvest was statistically different at the $p \leq 0.05$ level.

The yield of tubers (estimated ton/ac) of each variety is shown by size category in Table 4. The size profile of LW17-1 was not statistically different from that of Russet Burbank and Shepody in most of the size categories. LW17-2 had a significantly greater yield of tubers under 4 oz. and a significantly lower yield of tubers in the 6 to 10 category than LW17-1 or the standards and may not be well suited to an early harvest.

For varieties grown on low N and harvested in September, EPG17-2 and EPG17-3 yielded significantly more tubers in the 4 to 6 oz. and 6 to 10 oz. categories than Russet Burbank and Shepody (Table 4). Blazer Russet and Kennebec produced tuber size profiles similar to those of Russet Burbank and Shepody.

At the moderate level of N, there were some significant differences within size categories. ASPI010 yielded significantly more tubers in the smaller size categories. EPG17-3 yielded significantly more tubers in the 6 to 10 oz. category compared to the standards. EPG17-3 was not significantly different from EPG17-2, ASPI17-1, Bridget, Excellency and LW17-1 (Table 4). Several entries yielded size profiles similar to that of Russet Burbank. These include ASPI17-3, Basin Russet, Blazer Russet, Bridget, Kennebec, and LW17-1.

There were significant differences in the yield of tubers in most size categories for LW17-1 when comparing early harvest to September harvest. LW17-2 resulted in greater yield of tubers in all size categories except the under 4 oz. category in the full season plots. Both varieties benefited significantly from additional time in the field. Likely, more agronomic work is required with each of these to determine the best combination of fertility and growing season length.

Several entries were grown at low N (100 lbs/ac) and at a moderate rate of N (180 lbs/ac). ASPI010 yielded significantly more undersized tubers and a significantly lower yield of tubers over 10 oz. when provided with additional N. This variety may be an efficient user of nitrogen. Shepody produced a significantly lower yield of undersized tubers in response to the moderate rate of N. Fe other differences were observed for the entries in the study (Table 4).

Table 4: Estimated yield (ton/ac) in each size category (< 4 oz, 4 to 6 oz, 6 to 10 oz, > 10 oz, and deformed) for each French fry variety grown on approximately 100 lbs/ac nitrogen (Low N), 180 lbs/ac nitrogen (Moderate N) and 160 lbs/ac nitrogen (Early Harvest). Data shown is the mean of four replicates. Data followed by the same letter in each column of the table are not significantly different at the $p < 0.05$ level.

CDCS	< 4 oz	4 to 6 oz	6 to 10 oz	> 10 oz	Deformed
<i>Early harvest</i>					
LW17-1	7.7 b¥	3.9 a	1.1 bc¥	0.1 a¥	0.1 b
LW17-2	10.2 a	0.9 b¥	0.2 c¥	0.0 a¥	0.1 b
Russet Burbank	6.4 b¥	2.9 a¥	2.4 a¥	0.4 a¥	1.5 a¥
Shepody	5.4 b¥	2.5 ab	2.0 ab¥	0.4 a¥	0.9 a
<i>Low N – main harvest</i>					
ASPI010	8.5 a‡	7.9 a	7.3 b	2.0 c‡	0.1 a
EPG17-2	4.0 bc	6.2 a	12.7 a	7.2 abc	0.3 a
EPG17-3	5.0 b	6.9 a	13.1 a	11.0 a	2.2 a
ASPI17-2	0.8 d‡	2.8 b	6.9 b	3.8 bc	0.1 a
Blazer Russet	2.7 c	3.3 b	7.4 b	9.5 ab	0.7 a
Kennebec	3.1 bc	2.8 b	6.8 b	13.1 a	1.7 a
Shepody	3.0 c‡	2.7 b	5.8 b	7.8 abc	1.0 a
<i>Moderate N – main harvest</i>					
ASPI010	12.9 a‡	8.6 ab	5.0 e	0.4 e‡	0.2 c
EPG17-2	4.8 b-e	6.1 ab	10.9 abc	7.8 cde	0.4 bc
EPG17-3	4.5 b-e	5.1 c-f	12.9 a	16.0 ab	1.0 bc
ASPI17-1	5.3 bcd	4.6 c-f	9.8 a-d	12.5 abc	0.3 bc
ASPI17-2	1.8 e‡	2.5 ef	6.2 de	6.6 cde	0.2 c
ASPI17-3	4.5 b-e	4.1 c-f	7.9 b-e	9.7 a-d	2.0 abc
ASPI17-4	10.4 a	10.1 a	7.2 b-e	2.8 de	0.2 c
Basin Russet	2.6 cde	3.7 c-f	7.1 b-e	7.8 cde	2.5 abc
Blazer Russet	2.7 cde	3.3 c-f	6.1 de	8.6 b-e	0.6 bc
Bridget	7.2 b	8.6 ab	11.4 ab	6.9 cde	0.2 c
Excellency	10.4 a	9.4 a	10.0 a-d	5.5 cde	0.7 bc
Kennebec	3.6 cde	3.1 def	6.1 de	16.5 a	1.4 bc
LW17-1	3.4 cde¥	5.9 bcd	10.1 a-d¥	5.7 cde¥	0.5 bc
LW17-2	11.2 a	9.6 a¥	7.2 b-e¥	1.4 de¥	0.4 bc
California Russet Burbank	5.7 bc	5.5 cde	6.2 de	2.6 de	2.6 ab
Russet Burbank	4.4 b-e¥	4.2 c-f¥	7.6 b-e¥	8.5 b-e¥	3.6 a¥
Shepody	2.3 de¥‡	2.3 f	6.7 cde¥	11.6 abc¥	2.4 abc

‡ Data between the regular and low N plots was statistically different at the $p \leq 0.05$ level.

¥ Data between the Early Harvest and Main Harvest was statistically different at the $p \leq 0.05$ level.

Tuber samples used to measure specific gravity were evaluated for hollow heart, brown center, stem-end discoloration, other types of internal necrosis, scab and black scurf. Very few internal defects were observed in French fry varieties in 2017. Some stem-end discoloration was observed, but none of the tubers were tested for wilt organisms. EPG17-2 and Kennebec had some common scab lesions. All of the varieties had at least one tuber affected by black scurf, but no fungicide seed treatments were used in the trial.

French fry colour scores of composite samples are presented in Table 5. Some impressive fry scores were observed in the 2017 samples. LW17-2 produced light fries even when harvested early. From the low N plots, ASPI010 produced the lightest fries. On moderate N, ASPI010, EPG17-2, EPG17-3, ASPI17-3, Basin Russet, Bridget, Excellency, LW17-1, LW17-2 and California Russet Burbank produced light fries. Some of these also had good overall ratings taking texture and colour uniformity into consideration as well.

Table 5: Fry colour scores from subsamples of each variety grown on approximately 100 lbs/ac nitrogen (Low N), 180 lbs/ac nitrogen (Moderate N) and 150 lbs/ac nitrogen (Early Harvest). Fry Colour was assessed visually by comparison with a USDA fry colour chart and converted to a scale of 1 to 7 (000 = 7 and 4 = 1; the higher the number, the better the fry colour). Data shown is the result of one composite sample run in duplicate.

CDCS	External Colour ¹	Internal Texture ²	Colour Uniformity ³	Total Score
<i>Early harvest</i>				
LW17-1	4	4	3	11
LW17-2	5	4	4	13
Russet Burbank	3	2	2	7
Shepody	3	3	2	8
<i>Low N – main harvest</i>				
ASPI010	5	4	5	13
EPG17-2	4	4	3	11
EPG17-3	5	3	3	11
ASPI17-2	4	4	4	12
Blazer Russet	4	4	2	10
Kennebec	4	3	3	10
Shepody	4	3	3	10
<i>Moderate N – main harvest</i>				
ASPI010	5	3	5	13
EPG17-2	5	4	4	13
EPG17-3	5	4	2	11
ASPI17-1	3	3	1	7
ASPI17-2	4	4	3	11
ASPI17-3	5	2	3	10
ASPI17-4	4	3	2	9
Basin Russet	5	3	5	13
Blazer Russet	4	4	3	11
Bridget	5	3	4	12
Excellency	5	3	3	11
Kennebec	4	4	3	11
LW17-1	5	4	4	13
LW17-2	5	4	4	13
California Russet Burbank	5	3	4	12
Russet Burbank	4	4	3	11
Shepody	4	4	3	11

¹External Colour was assessed visually and compared with a USDA Color Chart (000 to 4; the lower the score, the better the fry colour); these scores were converted to a scale of 1 to 7 where higher scores are lighter fries.

²Internal texture: 1 (wet) - 4 (mealy)

³Color uniformity: 1 (very variable) - 5 (very uniform)

Conclusions

The 2017 variety trial included 14 French fry potato cultivars with potential in southern Alberta. Shepody was included in the trial as a check variety for early harvested cultivars, Shepody and Kennebec were included as standards for the low N plots, and Shepody, Kennebec and Russet Burbank were included as a full-season standard at the moderate rate of N.

Excellent yield and size distribution was observed with many of the varieties in the trial. The greatest total and marketable yield were observed with EPG17-3. Almost all of the varieties produced tubers with specific gravities in the desired range (1.085 to 1.095). Some of the varieties gave impressive fry scores. In particular, LW17-1, LW17-2, ASPI010, EPG17-2, Basin Russet, Blazer Russet and California Russet Burbank produced light fry colour.

The trial was designed to provide regional data for a wide range of potato cultivars. Addressing the agronomic needs of each variety may well result in improvements to yield and size profiles when compared to the results in this year of the trial.

Recommendations

- Varieties should be grown in southern Alberta for at least 3 years and these results need to be compiled to ensure a reasonable evaluation.
- To establish better estimates of yield potential and size profile for the varieties, each variety should be grown under optimal agronomic conditions (fertility, plant density, etc.).

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Contact Information:

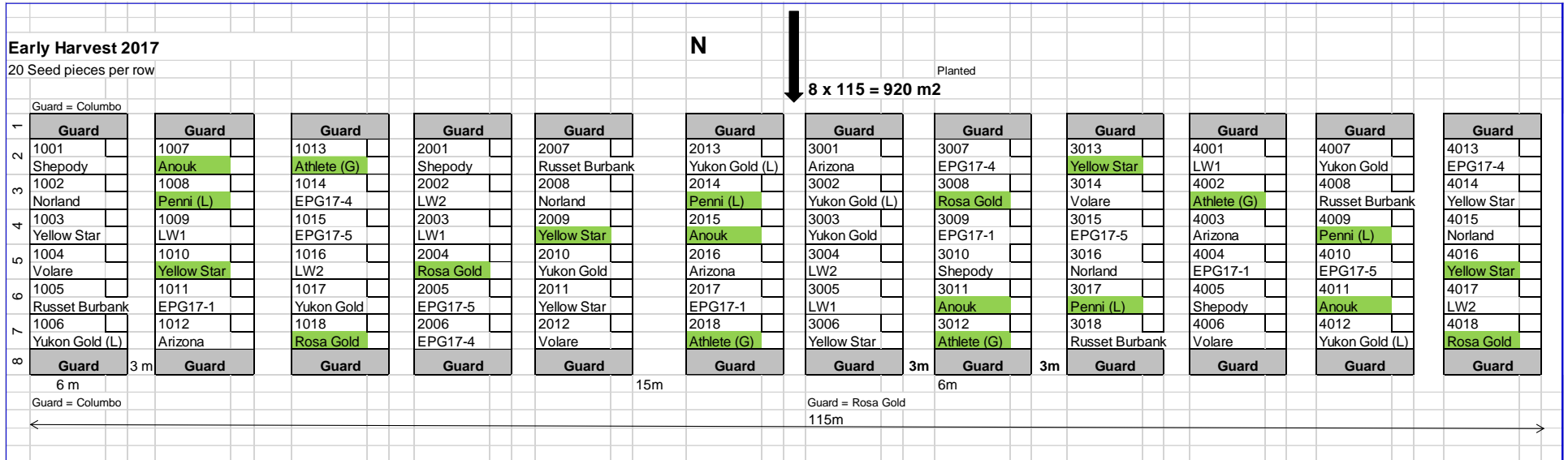
Michele Korschuh, Ph.D.
Potato Research Scientist
Alberta Agriculture and Forestry, CDGS
301 Horticultural Station Road East
Brooks, AB T1R 1E6

403-362-1314 phone

403-362-1306 fax

Michele.Konschuh@gov.ab.ca

Appendix A Plot Plans



Low N Variety Trial 2017 - September harvest

20 Seed pieces per row

24 X 66 = 1584 m2

N

Guard = Russet Burban

Row	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
24	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard
23	1001 PGP17-2	1011 TT17-3	1021 TT17-2	1031 Monticello	2001 TT17-10	2011 ODF009	2021 RV013	2031 Yukon Gold	
22	1002 TT17-5	1012 EPG17-3	1022 TT17-7	1032 Shepody	2002 TT17-7	2012 TT17-1	2022 EPG17-2	2032 PGP17-2	
21	1003 PGP17-4	1013 RV008	1023 AC Hamer	1033 EPG17-2	2003 AC Hamer	2013 Destiny	2023 PGP17-3	2033 Norland	
20	1004 TT17-9	1014 ODF007	1024 Blazer Russet	1034 RV013	2004 RV008	2014 Kennebec	2024 EPG17-3	2034 TT17-9	
19	1005 TT17-10	1015 RV014	1025 TT17-4	1035 PGP17-3	2005 PGP17-4	2015 ODF010	2025 TT17-4	2035 Monticello	
18	1006 AC Vigor	1016 Kennebec	1026 Destiny	1036 RV010	2006 RV011	2016 AC Vigor	2026 Shepody	2036 ODF007	
17	1007 Norland	1017 ODF009	1027 TT17-6	1037 Yukon Gold	2007 Lollipop	2017 Blazer Russet	2027 ASPI010	2037 TT17-6	
16	1008 RV011	1018 ASPI010	1028 RV009	5001 ODF007	2008 ASPI17-2	2018 TT17-2	2028 TT17-5	5004 AC Hamer	
15	1009 TT17-8	1019 ODF010	1029 Atlantic	5002 ODF009	2009 Atlantic	2019 TT17-3	2029 RV009	5005 Destiny	
14	1010 ASPI17-2	1020 TT17-1	1030 Lollipop	5003 ODF010	2010 TT17-8	2020 RV014	2030 RV010	5006 AC Vigor	
13	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	
	6m	3m						6m	
12	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	
11	3001 AC Vigor	3011 Destiny	3021 TT17-2	3031 PGP17-2	4001 ASPI010	4011 TT17-9	4021 PGP17-2	4031 TT17-6	
10	3002 AC Hamer	3012 Shepody	3022 ASPI010	3032 TT17-4	4002 TT17-1	4012 Monticello	4022 Kennebec	4032 TT17-10	
9	3003 TT17-6	3013 PGP17-3	3023 ASPI17-2	3033 Norland	4003 Norland	4013 TT17-5	4023 Shepody	4033 PGP17-4	
8	3004 Atlantic	3014 RV014	3024 ODF009	3034 Yukon Gold	4004 TT17-4	4014 TT17-3	4024 TT17-2	4034 EPG17-2	
7	3005 ODF007	3015 TT17-8	3025 Lollipop	3035 TT17-9	4005 RV011	4015 PGP17-3	4025 ODF007	4035 ODF009	
6	3006 Kennebec	3016 EPG17-3	3026 Monticello	3036 RV010	4006 ASPI17-2	4016 TT17-7	4026 EPG17-3	4036 Yukon Gold	
5	3007 TT17-3	3017 EPG17-2	3027 TT17-10	3037 RV008	4007 AC Vigor	4017 RV014	4027 ODF010	4037 Lollipop	
4	3008 RV011	3018 RV009	3028 TT17-5	5007 Atlantic	4008 Destiny	4018 Atlantic	4028 RV009		
3	3009 Blazer Russet	3019 PGP17-4	3029 TT17-7	5008 Monticello	4009 TT17-8	4019 RV013	4029 AC Hamer		
2	3010 RV013	3020 ODF010	3030 TT17-1		4010 RV010	4020 Blazer Russet	4030 RV008		
1	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	
	6m	3m				3m	3m	3m	

Variety Medium N Brooks - 2017 - Ful

20 Seed pieces per row

24 x 88m = 2112m²

N



12" spacing										
24	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	
23	3001	3011	3021	3031	3041	4001	4011	4021	4031	
22	Destiny	EPG17-4	Russet Burbank Calif	Bonnata	ODF007	Yukon Gold	LW17-1	EPG17-1	EPG17-4	
21	3002	3012	3022	3032		4002	4012	4022	4032	
20	Excellency	Monticello	Atlantic	ASPI17-9		ASPI17-5	ODF010	Norland	ODF007	
19	3003	3013	3023	3033		4003	4013	4023	4033	
18	PGP17-1	Blazer Russet	ASPI17-4	Red Apple		AC Vigor	Russet Burbank	Shepody	Destiny	
17	3004	3014	3024	3034		4004	4014	4024	4034	
16	Kennebec	ASPI17-2	Basin Russet	LW17-1		Russet Burbank Cali	ASPI010	ASPI17-2	ASPI17-7	
15	3005	3015	3025	3035		4005	4015	4025	4035	
14	AC Hamer	ASPI17-1	Rosa Gold	ASPI17-7		Kennebec	Cerata	Bridget	LW17-2	
13	3006	3016	3026	3036		4006	4016	4026	4036	
12	Bridget	ASPI17-8	ASPI010	LW17-2		ASPI17-9	Atlantic	RV012	AC Hamer	
11	3007	3017	3027	3037		4007	4017	4027	4037	
10	RV012	Yukon Gold	ASPI17-5	EPG17-1		ASPI17-1	ASPI17-4	ASPI17-8	AC Hamer	
9	3008	3018	3028	3038		4008	4018	4028	4038	
8	Norland	ODF010	EPG17-3	Russet Burbank		ODF009	PGP17-1	Red Apple	Bonnata	
7	3009	3019	3029	3039		4009	4019	4029	4039	
6	EPG17-2	AC Vigor	Shepody	Cerata		Blazer Russet	EPG17-3	Basin Russet	Excellency	
5	3010	3020	3030	3040	4041	4010	4020	4030	4040	
4	EPG17-5	AC Hamer	ODF009	ASPI17-2	Monticello	EPG17-2	Rosa Gold	EPG17-5	ASPI17-2	
3	Guard	Guard	Guard	Guard	Guard	Guard		Guard	Guard	
2	6m									
12" spacing										
Guard = Russet Burbank										
12	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	
11	1001	1011	1021	1031	1041	2001	2011	2021	2031	
10	ASPI17-2	ODF009	Destiny	EPG17-2	AC Hamer	ASPI17-2	ODF007	LW17-1	ASPI17-7	
9	1002	1012	1022	1032	5001	2002	2012	2022	2032	
8	ASPI17-2	Basin Russet	Rosa Gold	Bonnata	ODF007	ASPI17-5	Destiny	ASPI17-9	EPG17-4	
7	1003	1013	1023	1033	5002	2003	2013	2023	2033	
6	ASPI17-8	Bridget	Yukon Gold	ASPI17-4	ODF009	Basin Russet	EPG17-5	Rosa Gold	EPG17-1	
5	1004	1014	1024	1034	5003	2004	2014	2024	2034	
4	Kennebec	RV012	EPG17-5	Russet Burbank	Monticello	Bridget	AC Vigor	AC Hamer	ODF009	
3	1005	1015	1025	1035	5004	2005	2015	2025	2035	
2	Shepody	ODF010	Norland	ASPI17-5	ODF010	ASPI010	Atlantic	EPG17-3	EPG17-2	
1	1006	1016	1026	1036	5005	2006	2016	2026	2036	
0	ASPI17-1	AC Vigor	LW17-1	EPG17-4	Atlantic	Excellency	PGP17-1	RV012	AC Hamer	
-1	1007	1017	1027	1037	5006	2007	2017	2027	2037	
-2	ASPI17-9	LW17-2	AC Hamer	Russet Burbank Calif	AC Hamer	ASPI17-4	Red Apple	LW17-2	ASPI17-1	
-3	1008	1018	1028	1038	5007	2008	2018	2028	2038	
-4	EPG17-1	PGP17-1	Atlantic	ASPI010	Destiny	Bonnata	Shepody	ASPI17-8	Kennebec	
-5	1009	1019	1029	1039	5008	2009	2019	2029	2039	
-6	Monticello	Excellency	ODF007	Red Apple	AC Vigor	Russet Burbank	Russet Burbank Cali	Cerata	Yukon Gold	
-7	1010	1020	1030	1040	2041	2010	2020	2030	2040	
-8	EPG17-3	Blazer Russet	ASPI17-7	Cerata	ODF010	ASPI17-2	Norland	Blazer Russet	Monticello	
-9	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	Guard	
-10	6m									