Regional Variety Trials

Partners: Alberta Agriculture and Irrigation
Alberta Grains
St. Paul Municipal Seed Cleaning Plant
Agriculture and Agri-Food Canada
Nutrien Ag Solutions
Alberta Seed Processors
Alberta British Colombia Seed Growers
Alberta Oat Growers Association
Results Driven Agriculture Research

Objectives:

1. To detail agronomic characteristics of new varieties and proven varieties in a specific geographic area.
2. To provide information about new varieties to local producers.
3. To conduct these tests yearly to produce long term data.

Background:

Regional Variety Trials (RVTs) have been used as a means of testing superior varieties under different environmental conditions. One of the goals of the RVTs is to help researchers and producers identify varieties that are suitable for each particular environment. Multi-location trials often show genotype x environment interaction due to differential response of genotypes to different environmental conditions. Information on the genotype x environment response obtained through RVT's may be helpful in identifying and selecting high-yielding varieties with specific or broad adaptations to their environmental conditions.

Efficiency in the RVT's depends on selecting a large number of locations within a region with varying environmental conditions and assigning to each location the variety most likely to succeed. It is also essential to assess varieties in the trial in terms of their productivity and quality, and to assess stability in yields across years.

The regional variety trials (RVTs) have been grown in the Lakeland since 1991. Each variety is tested for three years against a common check variety that is kept in the trial long-term. Each year, new varieties are added and older ones are removed from the trial. How a variety does relative to the check variety can be used as a comparison between varieties that are not grown in the trial at the same time.

The information gathered from these trials is important for producers first, to aid in crop variety selection and, second, to improve economic returns. Determining the cereal varieties that are best suited to production in the LARA area will aid producers in making the most economical decisions for their operations.

The data presented in the following tables is a useful tool for comparing varieties to each other. Information should not be used to determine how much a variety will yield, but rather as a comparison of how one variety will yield in relation to another. The tables will tell how a certain variety yields statistically compared to another variety.

Methodology:

The trials were seeded as a randomized complete block design (RCBD) with four replicates to reduce error at Fort Kent (54º 18' N, 110º 37'W), St Paul (54º 5'N, 111º 15' W) and Smoky Lake (54º 6'N, 112º 38'W). Prior to seeding, soil samples were taken to a depth of 0-6" and 6-12" to determine the nutrient level and pH at A & L Canada Laboratories Inc. London, Ontario. LARA Fabro five row seeder was used for seeding with 9" row spacing. Plots were seeded to a depth of 1-1.5 inches depending on soil conditions and available moisture. The recommended rates of fertilizers were side banded during seeding. The plots measured 1.15 m by 6 m in area.

The trials were sprayed with a 3-point hitch sprayer once during the growing season. Prior to harvesting, the length of each plot was recorded to calculate the harvested area. Harvesting was done using Wintersteiger combine. Each plot was harvested individually, and other yield parameters were recorded accordingly.

Cereal Regional Variety Trials (RVT) contracted to LARA in 2023
Prepared by Sheri Strydhorst, PhD, PAg – ARVAC Regional Variety Trial Coordinator

LARA ran the following RVT trials for the Alberta Regional Variety Advisory Committee (ARVAC) in 2023:

Trial	Location	Data used in Tables
CPSR, SP, SWS	Fort Kent	Yes
CPSR, SP, SWS	St Paul	Yes
CWRS	St Paul	Yes
Barley	St Paul	Yes
Oats	Fort Kent	Yes
Oats	Smoky Lake	Yes
Triticale	St Paul	Yes

ARVAC grants permission to LARA to publish useable data, from single site years, but cautions that single site year data can be misleading and it is highly recommended to refer to compiled RVT data in the Alberta Seed Guide at seed.ab.ca.

Acknowledgement is given to the 2023 RVT funders: Results Driven Agricultural Research (RDAR), Alberta Grains, Alberta Seed Processors, Alberta British Columbia Seed Growers, Alberta Oat Growers Association, and Seed Companies who pay annual entry fees as program entrants.

Results:

RVT Oats, Fort Kent 2023

The yield, height, test weight and thousand kernel weight of RVT oats grown at Fort Kent are presented in table 1.1. These parameters differed significantly among all varieties. We had 12 oats varieties in the trial this year. A total of 7 varieties; CDC Byer (OT3115), CDC Anson, AC Morgan, AAC Anthony (OT7104), AAC Wesley, Kyron and Kalio yielded 10, 8, 6, 4, 2, 2 and 1% higher than the check variety (CS Camden), respectively. Varieties such as., CDC Arborg, Ore Level 48, AAC Neville and Ore BOOST (OT6037) yielded 2, 2, 10, and 11% lower than the check variety. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.1. RVT Oats, Fort Kent 2023.

Variety	Yield (% of CS Camden)		Height		TWT		TKW	
CDC Byer (OT3115)	110%	a	102.0	gh	42.4	ab	45.1	e
CDC ANSON	108%	ab	91.0	j	43.2	a	46.8	cde
AC MORGAN	106%	abc	110.0	c	42.3	ab	50.0	bc
AAC Anthony (OT7104)	104%	abcd	119.0	a	40.6	cd	51.7	abc
AAC WESLEY	102%	abcd	99.7	h	41.2	bc	44.8	e
KYRON	102%	abcd	102.3	fg	41.9	abc	44.1	e
KALIO	101%	abcd	107.3	d	42.4	ab	44.6	e
CS CAMDEN	100%	abcd	106.5	de	42.0	abc	49.7	bcd
CDC ARBORG	98%	bcd	116.3	b	41.9	abc	47.0	cde
ORE LEVEL 48	98%	bcd	104.7	ef	41.5	abc	48.5	bcd
AAC NEVILLE	90%	d	97.0	i	42.9	a	46.4	de
Ore BOOST (OT6037)	89%	d	111.0	c	39.1	d	54.1	a
Average	4173	g/plot	106.0	cm	41.7	lbs/bu	47.7	g/1000 seeds
ANOVA p-value	0.0271*		<.0001		0.0042		<.0001	
CV%	6.37%		1.34%		2.25%		4.16%	

Single site years of data are often an unreliable indicator of variety performance.
For publication in the Alberta Seed Guide, at least six site years over two growing seasons are required prior to reporting yield data.
Please reference the January 2024 - Alberta Seed Guide for multi-site year data.
Values followed by different letters (i.e., a,b,c) are statistically different.
Values followed by the same letter are NOT statistically different (i.e., a = ab, or abc = bc).
ANOVA p-value indicates statistical significance. If the p-value is less than 0.05, then there are significant differences in the described trait.
i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.

RVT Oats, Smoky Lake 2023

The yield, height, test weight and thousand kernel weight of RVT oats grown at Smoky Lake are presented in table 1.2. These parameters showed significant variations among all oat varieties grown at this location. All varieties yielded higher than the check cultivar, CS Camden. The highest

yield was obtained for CDC Byer (OT3115) which yielded 14% higher than the check variety. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.2. RVT Oats, Smoky Lake 2023.

Variety	Yield (% of CS Camden)		Height		TWT		TKW	
CDC Byer (OT3115)	114%	a	105.3	de	43.4	ab	43.3	e
AC MORGAN	113%	a	113.7	b	43.7	a	50.7	bc
KALIO	110%	ab	105.3	de	43.0	abc	45.7	de
KYRON	109%	abc	103.7	de	42.5	bc	47.2	cd
CDC ANSON	108%	abc	91.0	f	43.8	a	46.8	de
AAC Anthony (OT7104)	107%	bcd	122.7	a	40.6	d	55.7	a
AAC NEVILLE	106%	bcd	104.0	de	43.8	a	45.7	de
CDC ARBORG	104%	cde	111.0	bc	43.7	a	46.7	de
ORE LEVEL 48	104%	cde	107.0	cd	43.3	ab	46.5	de
OReBoost (OT6037)	103%	de	114.3	b	39.9	d	52.9	ab
AAC WESLEY	102%	de	101.7	e	41.8	c	45.8	de
CS CAMDEN	100%	e	105.7	de	41.8	c	47.1	cd
Average	4695	g/plot	107.1	cm	42.6	lbs/bu	47.8	g/1000 seeds
ANOVA p-value	0.0004		<.0001		<.0001		<.0001	
CV%	3.10%		2.63%		1.64%		4.44%	

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Values followed by the same letter are NOT statistically different (i.e., a = ab, or abc = bc).
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i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.

Barley RVT, St Paul 2023

We had 20 barley varieties in the trial this year. The yield, height, test weight and thousand kernel weight of barley RVT grown at Smoky Lake are presented in table 1.3. These parameters varied significantly among 20 barley varieties. A total of 10 varieties; AB Maximizer, CDC Durango, CDC Churchill, AAC Lariat, Ferguson (TR19758), AB Prime, AAC Stockington (TR20270), AB Brewnet, RGT Planet and RGT Asteroid, yielded 15, 8, 7, 7, 7, 6, 3, 2, 2 and 2% higher than the check variety (AAC Synergy), respectively. Varieties such as, CDC Austenson, CDC Copeland, AB Dram, AAC Prairie, Richer, AS Lafleur (CLO10-018,138), AC Metcalfe and AS Manon (CLO11-011,032) yielded 5, 6, 7,8, 10, 11, 13 and 14% lower than the check variety, respectively. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.3. Barley RVT, St. Paul 2023.

Variety	Yield (% of AAC Synergy)		Height		TWT		TKW	
AB MAXIMIZER	115%	a	76.3	cd	52.87	abcde	51.4	ijkl
CDC DURANGO	108%	abcd	74.7	def	53.47	abcd	52.7	fghijk
CDC CHURCHILL	107%	abcd	70.0	ghi	52.63	abcdefg	50.9	jkl
AAC LARIAT	107%	abcd	73.0	defg	52.90	abcde	56.0	abc
Ferguson (TR19758)	107%	abcd	66.7	i	52.60	bcdefg	50.1	l
AB PRIME	106%	bcd	81.0	b	51.47	g	51.9	hijkl
AAC Stockington (TR20270)	103%	cde	75.7	cde	52.93	abcde	55.1	bcde
AB BREWNET	102%	cdef	81.7	b	51.50	g	52.8	fghijk
RGT PLANET	102%	cdef	69.7	ghi	52.13	efg	56.5	ab
RGT ASTEROID	102%	cdef	67.3	i	52.97	abcde	53.5	defghi
AB STANDSWELL	100%	defg	68.3	hi	49.40	h	41.6	m
AAC SYNERGY	100%	defg	76.3	cd	51.93	efg	53.9	cdefgh
CDC AUSTENSON	95%	efghi	73.0	defg	53.77	ab	52.8	fghijk
CDC COPELAND	94%	fghij	74.3	def	52.00	efg	51.9	hijkl
AB DRAM	93%	ghij	79.0	bc	52.77	abcdef	51.9	hijkl
AAC PRAIRIE	92%	ghij	72.3	efg	51.60	fg	51.6	ijkl
RICHER	90%	hij	95.0	a	48.40	h	50.7	kl
AS Lafleur (CLO10-018,138)	89%	hij	71.7	fgh	53.87	a	53.0	efghij
AC METCALFE	87%	ij	75.7	cde	52.23	defg	51.5	ijkl
AS Manon (CLO11-011,032)	86%	j	82.3	b	53.70	abc	58.1	a
Average	3759	g/plot	73.8	cm	52.3	lbs/bu	52.7	g/1000 seeds
ANOVA p-value	<0.0001		<0.0001		<0.0001		<0.0001	
CV%	5.10%		2.97%		1.45%		2.48%	

Single site years of data are often an unreliable indicator of variety performance.
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Please reference the January 2024 - Alberta Seed Guide for multi-site year data.
Values followed by different letters (i.e., a,b,c) are statistically different.
Values followed by the same letter are NOT statistically different (i.e., a = ab, or abc = bc).
ANOVA p-value indicates statistical significance. If the p-value is less than 0.05, then there are significant differences in the described trait.
i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.

CWRS RVT, St Paul 2023

We had 13 CWRS wheat varieties in the trial this year. The yield, height, test weight and thousand kernel weight of CWRS RVT grown at St. Paul are presented in table 1.4. These parameters showed significant variations among 13 CWRS wheat varieties. All varieties grown in this trial yielded lower than the check variety, AAC Brandon. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.4. CWRS RVT, St. Paul 2023.

Variety	Yield (% of AAC Brandon)		Height		TWT		TKW	
AAC BRANDON	100%	a	87.3	abc	67.1	a	45.2	bcde
AAC Walker VB (BW1116)	99%	ab	85.0	c	66.7	ab	43.7	efg
AAC Spike (PT4002)	99%	ab	75.3	d	66.6	ab	40.4	hi
AAC WHITEHEAD VB	96%	abc	87.3	abc	64.6	g	46.1	abcd
AAC DUTTON VB	95%	abcd	86.3	abc	66.1	bcde	40.0	i
AAC VIEWFIELD	94%	bcd	79.0	d	66.7	ab	40.3	hi
DONALDA	92%	dce	89.7	abc	66.1	bcde	41.8	fghi
AAC HOCKLEY	91%	dcef	86.3	abc	66.5	abc	41.7	ghi
AAC HASSLER	90%	def	90.7	a	65.2	fg	42.5	fgh
CDC Envy (PT5003)	89%	def	85.0	c	65.3	efg	46.3	abc
AAC TOMKINS	88%	ef	89.3	abc	65.1	fg	44.0	def
AAC DARBY VB	87%	ef	90.3	ab	65.6	def	40.7	hi
AAC Westking (BW5090)	87%	ef	85.3	bc	66.2	bcd	47.3	ab
Average	3682	g/plot	85.9	cm	66.0	lbs/bu	43.3	g/1000 seeds
ANOVA p-value	<0.0001		<0.0001		<0.0001		<0.0001	
CV%	3.98%		3.60%		0.71%		0.31%	

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Values followed by different letters (i.e., a,b,c) are statistically different.
Values followed by the same letter are NOT statistically different (i.e., a = ab, or abc = bc).
ANOVA p-value indicates statistical significance. If the p-value is less than 0.05, then there are significant differences in the described trait.
i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.

Triticale RVT, St Paul 2023

The yield, height, test weight and thousand kernel weight of RVT Triticale grown at St. Paul are presented in table 1.5. We had only two triticale varieties in the trial this year. The yield and test weight differed significantly between varieties. The maximum yield was obtained for Brevis, which yielded 31% more than AB Stampeder. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.5. Triticale RVT, St Paul 2023.

Variety	Yield (% of Brevis)		Height		TWT		TKW	
BREVIS	131%	A	96	A	58.6	A	49.7	A
AB STAMPEDER	100%	B	103	A	55.6	B	51.1	A
Average	2470	g/plot	100	cm	57.1	lbs/bu	50.4	g/1000 seeds
ANOVA p-value	0.0205	**	0.0572	NS	0.0098	***	0.3176	NS
CV%	4.76%		2.05%		0.64%		2.60%	

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Values followed by different letters (i.e., a,b,c) are statistically different.
Values followed by the same letter are NOT statistically different (i.e., a = ab, or abc = bc).
ANOVA p-value indicates statistical significance. If the p-value is less than 0.05, then there are significant differences in the described trait.
i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.

CPSR/SWS/SP RVT - Fort Kent 2023

We had 10 CPSR/SWS/SP wheat varieties in the trial this year. The yield, height, test weight and thousand kernel weight for CPSR/SWS/SP RVT grown at Fort Kent are presented in table 1.5. These parameters differed significantly among 10 CPSR/SWS/SP wheat varieties grown in this trial. A total of 8 varieties; Alotta (GP250), AAC Rimbey VB, Pasteur, AAC Perform, AAC Westlock, AC Andrew, AAC Penhold and AAC Goodwin yielded 28, 15, 10, 10 8, 7, 2 an 1% higher than the check variety (AAC Brandon), respectively. The only variety which yielded lower than the check variety was UA Forefront. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.5. CPSR/SWS/SP RVT - Fort Kent 2023.

Class	Variety	Yield (% of AAC Brandon)		Height		TWT		TKW g/1000 seeds	
SP	ALOTTA (GP250)	128%	a	79.3	de	61.4	bc	46.2	a
CPSR	AAC RIMBEY VB	115%	bc	81.0	cde	62.1	ab	41.5	bc
SP	PASTEUR	110%	bcd	82.3	bcd	60.3	cd	35.0	e
CPSR	AAC PERFORM	110%	bcd	85.0	ab	60.4	cd	36.8	de
CPSR	AAC WESTLOCK	108%	bcd	86.0	a	62.5	ab	42.9	ab
SWS	AC ANDREW	107%	cd	78.7	e	59.5	de	38.7	cd
CPSR	AAC PENHOLD	102%	d	69.3	g	62.6	a	42.8	ab
CPSR	AAC GOODWIN	101%	de	77.7	e	63.3	a	37.7	de
CWRS	AAC BRANDON	100%	de	82.3	bcd	63.3	a	39.0	cd
CPSR	UA FOREFRONT	89%	e	77.7	e	60.7	c	43.4	ab
	Average	3603	g/plot	79.5	cm	61.5	lbs/bu	39.6	g/1000 seeds
	ANOVA p-value	0.0002		<0.0001		<0.0001		<0.0001	
	CV%	6.56%		2.71%		1.12%		5.46%	

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ANOVA p-value indicates statistical significance. If the p-value is less than 0.05, then there are significant differences in the described trait.
i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.

CPSR/SWS/SP RVT – St. Paul 2023

The yield, height, test weight and thousand kernel weight of CPSR/SWS/SP RVT grown at St. Paul are presented in table 1.6. These parameters showed significant variations among 10 CPSR/SWS/SP wheat varieties grown in this trial. A total of 6 varieties; AAC Rimbey VB, Pasteur, AAC Perform, AC Andrew, Alotta (GP250) and AAC Goodwin yielded 16, 9, 8, 6, 4 and 3% higher than the check variety (AAC Brandon), respectively. Varieties such as, AAC Penhold, UA Forefront and AAC Westlock yielded 4, 4 and 9% lower than the check variety. More information is available on https://www.seed.ab.ca/variety-data/cereals/.

Table 1.6. CPSR/SWS/SP RVT – St. Paul 2023.

Class	Variety	Yield (% of AAC Brandon)		Height		TWT		TKW	
CPSR	AAC RIMBEY VB	116%	b	85.3	bcd	66.5	ab	51.8	ab
SP	PASTEUR	109%	bcd	88.7	ab	65.2	c	44.0	ef
CPSR	AAC PERFORM	108%	bcd	86.0	bcd	66.1	abc	47.8	cd
SWS	AC ANDREW	106%	bcde	87.3	abc	63.9	d	44.6	def
SP	ALOTTA (GP250)	104%	cde	86.3	bcd	63.6	d	55.4	a
CPSR	AAC GOODWIN	103%	cde	84.0	cde	66.8	a	45.1	de
CWRS	AAC BRANDON	100%	def	86.3	bcd	66.8	a	46.3	cde
CPSR	AAC PENHOLD	96%	ef	79.0	f	66.0	abc	52.5	ab
CPSR	UA FOREFRONT	96%	ef	80.3	ef	65.2	c	49.2	bc
CPSR	AAC WESTLOCK	91%	f	86.0	bcd	65.3	c	51.7	ab
	Average	3860	g/plot	84.8	cm	65.5	lbs/bu	47.9	g/1000 seeds
	ANOVA p-value	<.0001		0.0002		<0.0001		<0.0001	
	CV%	5.98%		3.15%		0.97%		4.62%	

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i.e., ANOVA p-value of <0.0001 for yield means that at least one variety has a statistically different yield.
i.e., ANOVA p-value of > 0.05 means there are no statistical differences in the trait between any of the varieties.